How CPR Checked Wheel Wear on This Train . . . Page 27

RAILWAY

LOCOMOTIVES AND CARS

A SIMMONS-BOARDMAN TIME-SAVER PUBLICATION APRIL 1958

Burlington Reconditions Power Assemblies for These Engines . . . Page 32

SAFE · FAST DEPENDABLE

Non-Spin

CERTIFIED BY

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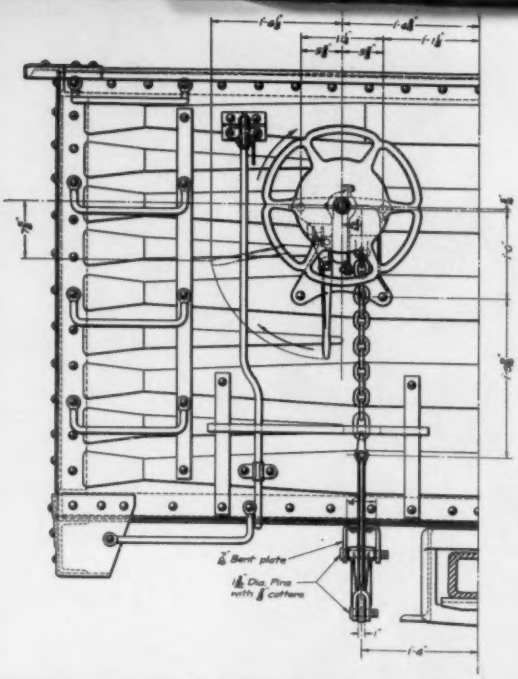

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POWER HAND BRAKE

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- COMPLETE SAFETY FOR THE BRAKEMAN
- GREAT DURABILITY
- AMPLE BRAKING POWER WITH ONE HAND
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W. H. MINER, INC.

CHICAGO

here's why NATIONAL Rewind Kits help you do a better job ...more easily, more quickly and more economically

1. Coils are of the highest quality . . . and each one fits exactly as it should.

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NATIONAL ELECTRIC COIL COMPANY

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USG® BRUSH GRADES AY 32 AND 2306

service proved for diesel main generators

USG Brush Grades AY 32 and 2306 have proved their high performance in main generators on Diesel-electric locomotives in every type of service. Because of longer life USG Brushes actually reduce down time due to generator overhaul. Brush replacement as well as commutator wear is held to a minimum. A performance test on your equipment will prove that USG Brushes will give you superior commutation and longer service life. Only USG Brushes have Statite® . . . the permanent shunt connection that cannot be pulled out or jarred loose. Statite retains its original low millivolt shunt drop. Now's the time to try USG Brush Grades AY 32 and 2306 with Statite connections that have never failed in millions of miles of railroad service! Why not order today?

Send for the latest USG Brush Catalog B-56 and the new USG Brush Grade List, both are excellent for designing or for specific applications.

223

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RAILWAY
LOCO-MOTIVES AND CARS

The Oldest Trade Paper
In the United States

Editorial and Executive Offices:
30 Church Street, New York 7

Railway Locomotives and Cars is a member of the Audit Bureau of Circulation (A.B.C.) and is indexed by the Engineering Index Service. Printed in U.S.A.

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TIME-SAVING IDEAS FOR

APRIL 1958

Volume 132 • No. 4

MOTIVE POWER AND CAR

ELECTRICAL

DEPARTMENTS

A new Wabash car is equipped with N-S-F *at the General American shops in East Chicago, Indiana. The Wabash has 1,960* N-S-F *cars currently in service or on order.*

N-S-F® helps "Follow the Flag" WABASH MOVE ahead

"Here on the Wabash we're always moving ahead. NAILABLE STEEL FLOORING *provides more Class A cars for our shippers and helps us give better service to the Heart of America."*

—A. K. Atkinson, President
Wabash Railroad Company

N-S-F is a registered trademark of Stran-Steel Corp.

Service-minded railroads are building longer life and greater shipper satisfaction into their boxcars and gondolas by using NAILABLE STEEL FLOORING. Years of service experience show that N-S-F, pioneer in the field, adds structural strength to the underframe, eliminates floor repair problems, withstands the stress of concentrated weight, and helps move more freight with fewer cars.

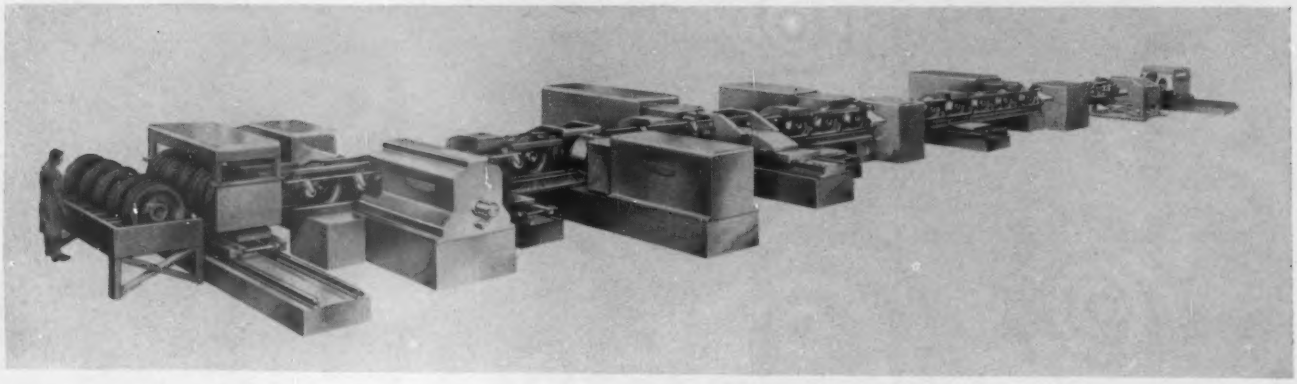
For complete performance and cost studies on N-S-F in new or heavy repair applications, contact our nearest representative in Chicago, New York, Philadelphia, St. Louis, Cleveland, San Francisco, Minneapolis, Atlanta. In Canada, N-S-F is made and sold by International Equipment Co., Ltd., Montreal.

NAILABLE STEEL FLOORING
Originated and sold by—

STRAN-STEEL CORPORATION

Dept. L-2 • Detroit 29, Michigan • Division of

NATIONAL STEEL CORPORATION

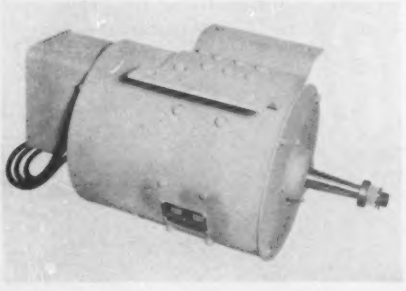


Automatic Car Wheel Machining

The first automated, five-machine transfer line which will completely machine railroad car wheels at a rate of one wheel every 90 sec is being designed and built for the Standard Steel Works division of Baldwin-Lima-Hamilton. To be delivered late in 1958, the transfer machine will handle the wheels in a vertical position throughout. Wheels will be automatically transferred from one station to the next, eliminating considerable handling.

Each of the five machines is actually a separate machine tool, interlocked with load, unload, and inspection stations to operate as one machine which will accurately perform the following operations in sequence: (1) loading; (2) rough boring; (3 and 4) facing; (5 and 6) turning; (7) inspection, and (8) unloading. The controls system will allow the entire line to be operated as a single machine or enable each machine and intermediate unit to be operated individually without affecting the rest of the line.

The machine, being manufactured at a cost of about $600,000, will weigh approximately 340,000 lb. It will be 118 ft long, 30 ft wide, and 7 ft high. *Kearney & Trecker, Dept. RLC, 6784 W. National ave., Milwaukee 14.*



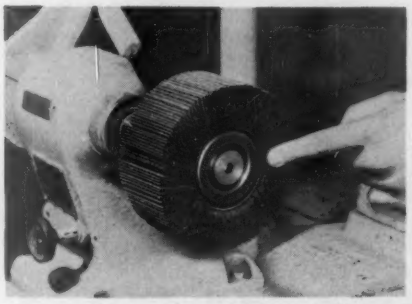
Caboose Power Supply

To meet all contingencies in supplying power to cabooses, a small 3-kw, 40-volt generator with exceptionally wide speed range, is now available. With 33-in. wheels and a 5.28:1 drive ratio, the cut-in speed is 7.6 mph. This corresponds to a generator speed of 412 rpm.

The machine will assume full load at 10.4 mph and will carry it up to 84.2 mph or a generator speed of 4,400 rpm. Regulation is within 3 per cent over the entire speed range.

The generator which is totally enclosed is 15 in. in diameter, 33⅛ in. long and weighs 45 lb less than the previous design made by the same manufacturer. Added features are interpoles for improved commutation and a mechanical pole changer instead of rocking brushes. There are no flexible leads on the pole changer. Bearings are double-shielded and pre-lubricated. There are inside grease caps filled with grease to seal the bearings from external contamination and thus extend bearing life.

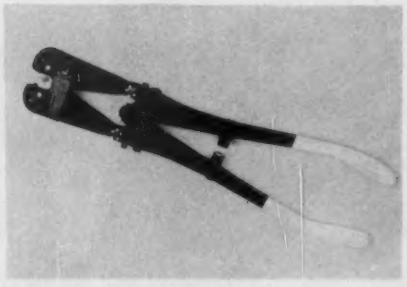
Either belt or gear drive may be used. The mounting and bracket shown may be replaced by a support to be used with a tension suspension for belt drive. *Safety Industries, Inc., Dept. RLC, New Haven, Conn.*



Polishing and Grinding Wheels

These coated abrasive polishing and grinding wheels, designated PG, are for finishing and maintenance operations. They are designed for flush sanding and are equipped with disposable flanges. The flanges, which lock the wheel's abrasive coated leaves securely in place, are factory installed and bonded to the core, making it unnecessary to remove the flanges when a wheel change is required. The flanges provide hub strength not previously available on the PG wheels and eliminate the need for stocking extra flanges.

Flanges and end cap nuts are recessed so that the wheels can be used flush against a surface as in finishing a right angle or corner. Specifications include a standard 1 in. center hole on wheels 6 in. in diameter and a standard 1¼ in. center hole on wheels 7, 8, 9 or 10 in. Wheels 11 in. and larger will continue to use the manfacturer's changeable aluminum flanges. *Minnesota Mining & Manufacturing Co., Dept RLC F7-268, 900 Bush st., St. Paul 6, Minn.*



Multi-Range Hand Crimping Tool

This multiple range hand tool, Model 600,-000, is for crimping A-MP solderless electrical terminals and connectors through the

(*Continued on page 65*)

Yellow Strand Braided Safety Slings

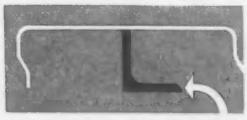
You're sure with Yellow Strand Braided Safety Slings on your equipment. These slings combine strength and flexibility to provide safety and ease of handling.

There's a Yellow Strand Sling designed to handle any load on your railroad from a highly polished crankshaft to a Diesel locomotive. Write us today and tell us the size, weight and nature of your problem lift. Our engineers will design a sling to exactly meet your needs! Broderick & Bascom Rope Co., 4203 Union Blvd., St. Louis 15, Mo.

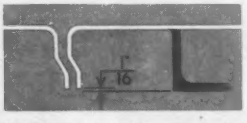
Yellow Strand® **WIRE ROPE**

P-S
NAILABLE STEEL FLOOR

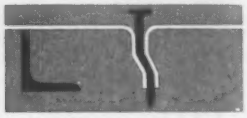
Provides the Smoothest, Strongest Car Floor



RESISTS CRUSHING AND DISHING—Pullman-Standard design incorporates the use of copper-bearing steel angle as plank support running the full length of each plank. This support gives the P-S floor exceptional strength . . . helps prevent crushing and dishing by heavy loaded lift trucks and racks.



RIDGES CAN'T DEVELOP—P-S design provides a 1/16" underframe clearance at each plank joint. This flexibility prevents planks from offsetting if there is any variation in plank depth. Smooth floor prevents package gouging and allows lift trucks to roll smoothly.

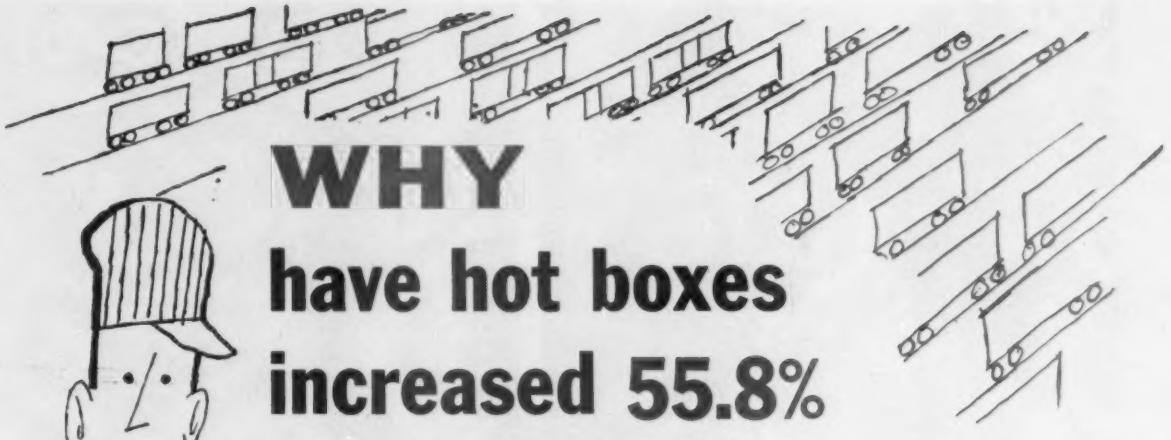


GROOVES CAN'T LOSE NAIL HOLDING POWER—Design of P-S floor prevents nailing grooves from deforming permanently. Grooves retain original holding power on 16d, 20d and 30d nails even after use of 40d nail.

- Section properties of the 10-gauge P-S floor reveal it to be nearly twice as strong as other steel floors.
- P-S Nailable Steel Floor is welded to car underframe on the copper-bearing steel reinforcement angles at plank center away from nailing groove. Welding can not affect groove filler . . . filler can not contaminate weld.
- P-S narrower planks with 6" groove centers provide greater strength and more nailing grooves.
- P-S flexible nailing joint springs back . . . retains original holding power even after use of 30d or 40d nails.

For more detailed information on this outstanding lading protection product . . . for more reasons why you should specify Pullman-Standard Nailable Steel Floor . . . for proof on how it minimizes floor maintenance, provides superior nail holding power and more nailing surface, write to Pullman-Standard or contact your nearest P-S sales office.

PULLMAN-STANDARD
CAR MANUFACTURING COMPANY
SUBSIDIARY OF PULLMAN INCORPORATED
221 N. LA SALLE STREET, CHICAGO 1, ILLINOIS
BIRMINGHAM, PITTSBURGH, NEW YORK, SAN FRANCISCO



WHY have hot boxes increased 55.8% since 1954?

The A.A.R. figures are accurate and clear! A total of 142,245 hot boxes experienced in the first eight months of 1957 against only 91,277 in the like period of 1954! What's responsible? Lack of proper supervision? Lack of proper maintenance procedures? Poorly renovated thread Packing? Or the multitude of gadgets and pads introduced in those years?

The answer is probably a combination of all these factors. The fact remains, however, that in 1954, when journal boxes were packed with new and renovated thread Packing according to A.A.R. specs, there were almost *51,000 fewer hot boxes* than this year! Think of the savings, had this record been maintained!

There's an even more basic savings to consider. As an example:

2,000,000	Freight cars packed with substitutes such as pads, etc., not yet proved *in service*, @ an average price of about $40.00 per car set	$ 80,000,000.
2,000,000	Freight cars packed with approved A.A.R. Journal Box Packing @ approximately $4.90 per car set	$ 9,800,000.
	Savings	**$ 70,200,000.**

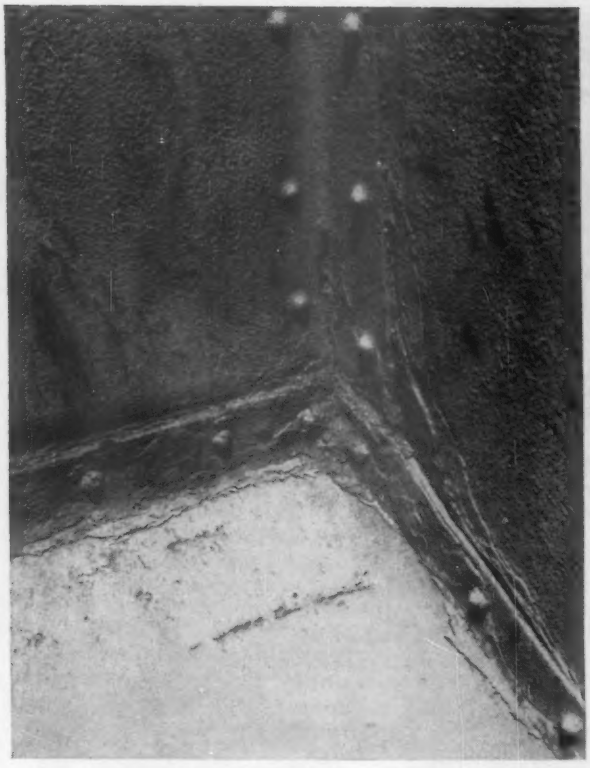
It all adds up to real economy when you stick to tried-and-true measures. In short, there is no economical replacement for A.A.R. Approved Journal Box Packing.

INSTITUTE OF JOURNAL BOX PACKING MANUFACTURED ACCORDING TO A.A.R. SPECIFICATIONS MEMBER THREAD MACHINERS

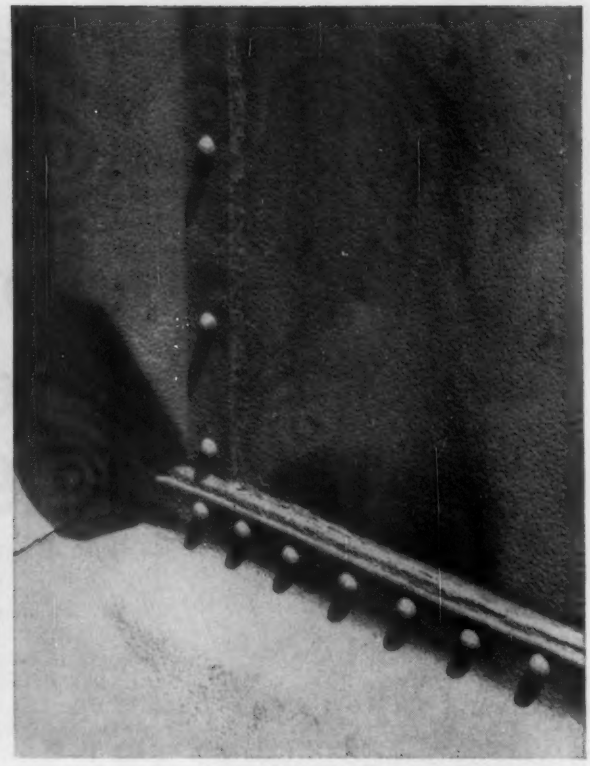
INSTITUTE OF THREAD MACHINERS, INC.

141 East 44th Street, New York 17, New York

Atlas Processing Corp., New York, N. Y.
Meyer Burstein & Sons, Neenah, Wisconsin
Dallas Waste Mills, Dallas, Texas
The J. Milton Hagy Waste Works, Philadelphia, Pa.
John J. McGrath, Inc., Philadelphia, Pa.
National Waste Company, New York, N. Y.
O'Neill Brothers, Inc., Philadelphia, Pa.
The Pittsburgh Waste Co., Inc., Swissvale, Pa.
Riverside Mills, Augusta, Ga.
Royal Manufacturing Company, Perth Amboy, N. J.
Southland Manufacturing Co., Inc., Norfolk, Va.
Twin City Textile Mills Waste Co., St. Paul, Minn.



A copper-bearing steel



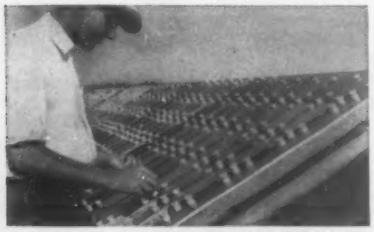
A nickel-copper high strength low alloy steel

How Corrosion Research helps lower car maintenance costs

Examine these hopper car interiors. Both have seen ten years of similar service.

Look first at the picture on the left. This is a copper-bearing steel with a good measure of corrosion resistance. Yet notice the rust, the spalling.

Now look at the picture on the right. This is a nickel-copper high strength low alloy steel. All you see is a thin, tightly adherent oxidized surface . . . a surface that protects the base metal, slows the progress of corrosion. This car should provide at least 50% longer life for its owners before it must be repaired.



Inco Corrosion Research at Kure Beach, near Wilmington, N. C. Here, atmospheric corrosion data gathered over many years on thousands of specimens provides answers to one of industry's most urgent problems.

A product of corrosion research

Since 1925, nickel-copper steels have been under study by Inco. The goal: to find low cost alloy steels for car frames and plates with improved corrosion resistance and higher strength . . . and reduce the staggering repair bill caused the industry by corrosion each year.

As one family among a host of corrosion-resisting materials that are improving operating economy throughout industry, nickel-copper steels have done a good job. Cars keep rolling longer, need less shop work, and are lighter, permitting bigger payloads.

If you have a corrosion problem...

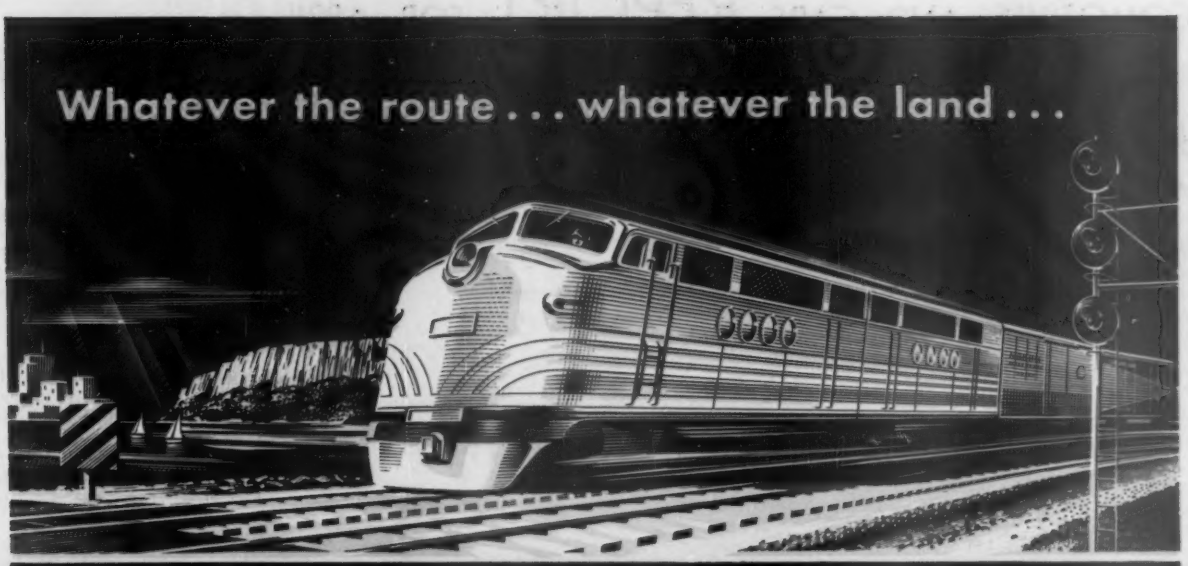
You owe it to yourself to talk with Inco's corrosion engineers. They have gathered data on hundreds of metals, alloys and coatings. It's data that was gathered to help you.

48 Pages of Help: compositions, fabricating and welding characteristics, corrosion resistance and mechanical properties of nickel-copper high strength low alloy steels are discussed in the Inco booklet *"Nickel-Copper High Strength Low Alloy Steels."* Please drop us a card for your copy.

The International Nickel Company, Inc.

67 Wall Street INCO New York 5, N. Y.

INCO NICKEL



Its performance and name are the same around the world

Other Outstanding Shell Industrial Lubricants

Shell Tellus Oils—for closed hydraulic systems
Shell Alvania Grease—multi-purpose industrial grease
Shell Rimula Oils—for heavy-duty diesel engines
Shell Turbo Oils—for utility, industrial and marine turbines
Shell Dromus Oils—soluble cutting oils for high-production metal working
Shell Macoma Oils—for extreme pressure industrial gear lubrication
Shell Voluta Oils—for high-speed quenching with maximum stability

Shell Talona R Oil 40 offers two outstanding reasons for its acceptance as a top-rated diesel-electric locomotive lubricant: (1) It provides superior anti-wear protection. (2) It maintains engine performance at its peak.

Greatly reduced wear on pistons, rings and cylinder liners is assured because of the selected combination of additives used in Talona® R Oil 40. It has high oxidation stability, combined with resistance to corrosion and sludge formation. It prevents ring fouling and provides excellent detergent-dispersant action.

Today—railroad operators abroad can enjoy the same Talona R Oil 40 that domestic carriers rely upon. For complete information, write to Shell Oil Company, 50 West 50th St., New York 20, N. Y., or 100 Bush Street, San Francisco 6, California.

SHELL TALONA R OIL 40

SHELL

LOCOMOTIVES AND CARS REPORT FOR APRIL

Orders and Inquiries for New Equipment

Placed Since the Closing of the March Issue

Freight-Car Orders

Road and builder	No. of cars	Type of car	Cap. tons	Other detail
AMERICAN REFRIGERATOR TRANSIT CO.:				
Pacific Car & Fdry.	300	Beef rail refrigerators	40	Estimated unit cost, $13,500. For July delivery.
ATCHISON, TOPEKA & SANTA FE:				
Company shops	25	Flat	70	——
MINNEAPOLIS, ST. PAUL & SAULT STE MARIE:				
Company shops	1	Flat	250	——
MISSOURI-KANSAS-TEXAS:				
Pullman-Standard	15	Covered hopper	70	Immediate delivery.
NORFOLK & WESTERN:				
American Car & Fdry.	50	Covered hopper	70	Being delivered.
UNION PACIFIC:				
American Car & Fdry.	52	Covered hopper	70	100 cars to be equipped with Timken
Pullman-Standard	48	Covered hopper	70	all-purpose bearing assembly units. Truck side frames to be narrow pedestal type.

C. L. Combes

A. G. Oehler

RL&C Editorial Staff Changes

CHARLES L. COMBES, who since 1948 has been managing editor and, later, editor of the Car Builder's Cyclopedia and the Locomotive Builders' Cyclopedia, on March 1 rejoined the staff of Railway Locomotives and Cars as managing editor and mechanical editor of the Railway Age. During that period he also served as manager of the Book Department of Simmons-Boardman. Mr. Combes is a graduate of Cornell University, having received his degree in mechanical engineering in 1930. His railroad career started on the Delaware & Hudson during the summers of 1923 and 1924 and continued after graduation as a test engineer in the motive power department of that road until 1938. He joined the staff of Railway Age and the then Railway Mechanical Engineer and continued until 1941, at which time he entered military service as an officer in the Coast Artillery and the Ordnance Department until 1945. Since then he has been continuously with Simmons-Boardman.

ALFRED G. OEHLER, who retired on March 31, after 41 years of editorial service with Simmons-Boardman, received his degree of bachelor of science in electrical engineering from the University of Wisconsin in 1911, served two years in the test department of the General Electric Company and later with public utility companies in Wisconsin before starting his railroad career with the Northern Pacific as an electrical foreman. Mr. Oehler came with Simmons-Boardman in 1917 as managing editor of the then Railway Electrical Engineer (later combined with Railway Mechanical Engineer) and electrical editor of Railway Age. Mr. Oehler's association with these publications as electrical engineering editor has carried over the period during which some of the major railroad electrification projects were completed, as well as the more recent period during which the more spectacular railway "electrification" took place as the result of the replacement of steam motive power by the diesel-electric locomotive. Mr. Oehler will continue to maintain contact with the field as a contributing editor for these publications.

Joint ASME-AIEE Railroad Conference

The American Society of Mechanical Engineers and the American Institute of Electrical Engineers will hold a joint Railroad Conference at the Hotel Statler, Cleveland, April 9 and 10. The program for the conference is as follows:

April 9

9 am

Practical Air Filtration for Diesel Locomotives, M. B. Adams, general supervisor diesel engines, Atchison, Topeka & Santa Fe.

Practical and Economic Limitations of Cleaning Operations on Diesel-Electric Locomotives, D. H. Noble, Chicago Rock Island & Pacific, and B. L. Judy, General Electric Co.

An Evaluation of the Effect of Dirt on Diesel-Electric Locomotives, J. W. Horine, electrical engineer, Pennsylvania.

Methods of Improving Utilization of Motive Power, G. T. Bevan, General Electric Co.

2 pm

Field Experience with Electrostatic Pre-

(*Continued on page 18*)

Summary of Monthly Hot Box Reports

Month	Cars set off between terminals with hot boxes: System	Foreign	Miles per car set off
December 1953	1,581	2,550	642,958
December 1954	1,501	2,994	725,070
December 1955	1,819	3,774	522,444
1956			
January	2,029	4,302	462,029
February	2,570	5,611	341,542
March	2,517	6,212	346,853
April	3,202	6,881	290,626
May	4,672	10,903	196,688
June	6,777	15,125	135,774
July	8,484	16,067	113,573
August	9,891	16,892	113,474
September	6,834	12,629	149,970
October	4,357	8,429	243,505
November	2,650	5,560	359,759
December	2,256	4,436	438,425
1957			
January	3,373	6,121	291,453
February	3,272	6,844	264,538
March	3,164	6,687	307,306
April	3,949	8,447	228,493
May	6,580	12,691	154,387
June	8,285	16,277	115,749
July	10,438	18,819	96,064
August	9,662	17,639	109,839
September	6,736	12,066	147,694
October	4,616	8,050	233,004
November	2,839	4,762	370,693
December	2,833	3,486	462,475

Summary of Annual Hot-Box Reports

Year	Cars set off between terminals with hot boxes: System	Foreign	Miles per car set off
1950*	31,183	64,499	183,144
1951	60,136	140,940	172,703
1952	64,595	115,901	190,109
1953	56,328	100,000	219,761
1954	53,785	75,058	247,932
1955	51,526	90,525	242,233
1956	56,239	113,047	209,479
1957	65,146	121,890	182,435

* July through December 1950 only.

Key to Successful Railroading

NATIONAL

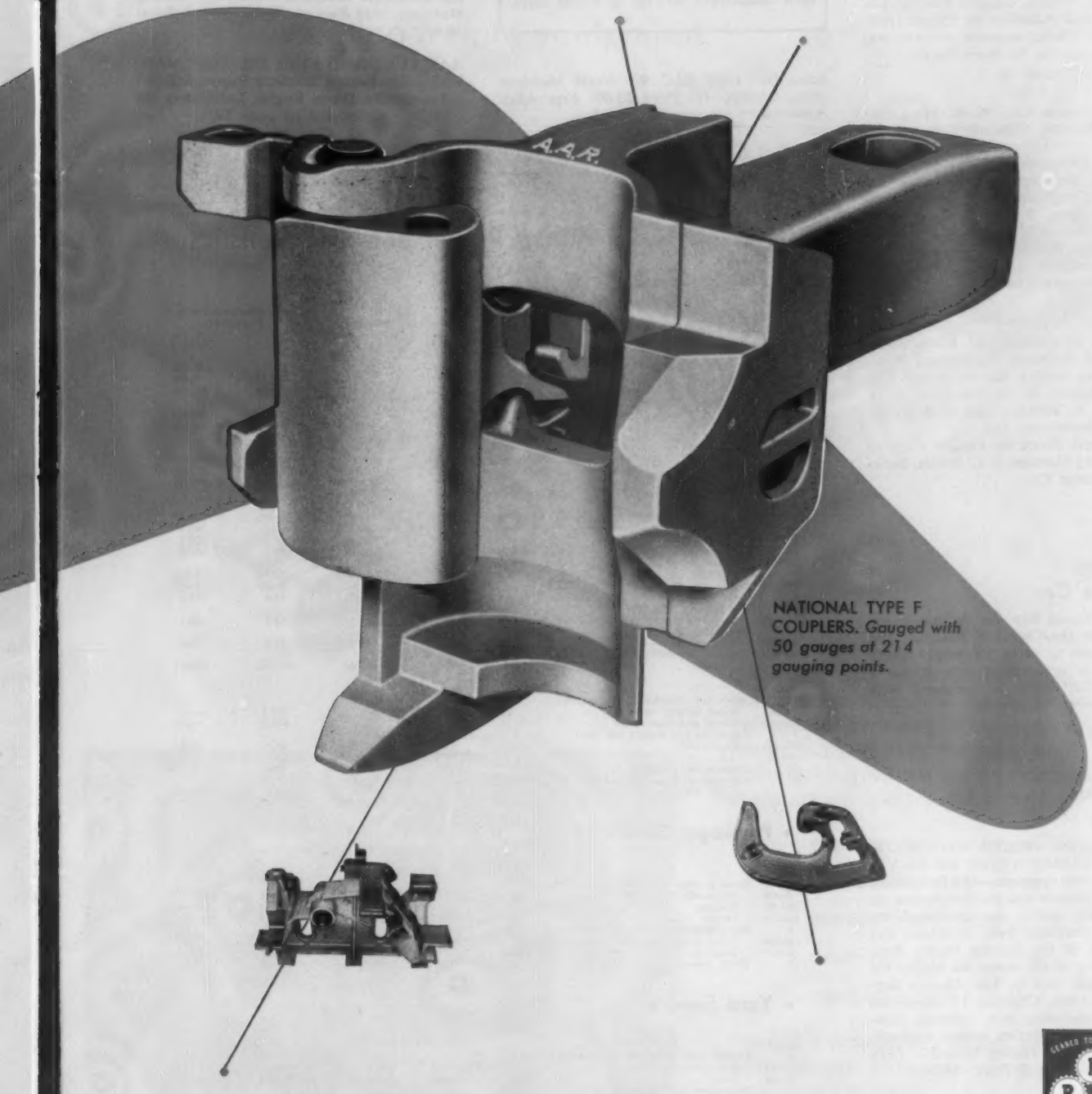
National was a leader in the introduction of the standard Type E Coupler in 1932 . . . again in 1945 with the introduction of the Type H Tightlock Coupler . . . and still again with the development of the remarkable Type F Coupler for freight service.

National leadership is based on many things—service . . . close quality control . . . and precise gauging to standards that exceed AAR minimum requirements. That means *National couplers look better . . . perform better . . . last longer.*

AA-676

The Railroads are moving ahead—with National Specialties

COUPLERS



NATIONAL TYPE F COUPLERS. *Gauged with 50 gauges at 214 gauging points.*

NATIONAL MALLEABLE and STEEL CASTINGS COMPANY

GEARED TO PROGRESS P R I MEMBER

Established 1868

Railway Division Headquarters
Cleveland 6, Ohio

International Division Headquarters
Cleveland 6, Ohio

CANADIAN SUBSIDIARY

National Malleable and Steel Castings Company of Canada, Ltd.
Toronto 1, Ontario

COUPLERS
YOKES
DRAFT GEARS
FREIGHT TRUCKS
JOURNAL BOXES

(Continued from page 14)

cipitator on Diesel Locomotive Engine Air Intake, Peel Kangas and W. C. Kern, Baltimore & Ohio, and E. L. Richardson, Westinghouse Electric Corp.

Railway Traction Equipment Ventilating Systems, B. A. Widell, General Electric Co.

Improving Rail Adhesion on Diesel Locomotives, P. V. Garin, engineer research and mechanical standards, Southern Pacific.

April 10
9 am

The Hydracushion Car, W. K. MacCurdy and R. M. Hermes, Stanford Research Institute.

Wheel Slip Detection in Railroad Braking, C. M. Hines, Westinghouse Air Brake Co.

An Analog Computer Study of a Torsional Vibrations Problem, R. T. Gray and S. W. McElhenny, General Electric Co.

Available and Potential Developments in Design for Standard AAR Bearing Assemblies, M. A. Hanson, chief engineer, Magnus Metal Corp.

2 pm

Railroading in Canada, R. E. Swanson, Department of Railroads, Vancouver, B. C.

Aluminum in Rolling Stock: Impact Test at Collision Speeds, R. A. Campbell, J. G. Sutherland, J. F. Whiting, and R. A Kemp, Aluminum Laboratories, Ltd.

Vibration and Shock in Freight Cars as Cause of Lading Damage, J. C. Settles, Buckeye Steel Castings Co.

CNR Testing Heated Box Car

A prototype heated box car is undergoing rigorous test on the Canadian National. The unit is designed to carry all winter traffic now handled in refrigerator cars. It has a capacity of 3,220 cu ft as compared with 2,273 cu ft for a refrigerator car.

Miscellaneous Publications

SYMPOSIUM ON RAILROAD MATERIALS AND LUBRICATING OILS.—Volume comprises two symposia—the Symposium on Railroad Materials and the Symposium on Lubricating Oils which are published together since interrelated both in subject and in presentation at the Second Pacific Area National Meeting of the American Society for Testing Materials held in Los Angeles September 16-21, 1956. Contains 17 papers on diesel fuels, lubricating oils, cleaning compounds, and nondestructive testing methods. *American Society for Testing Materials, 1916 Race st., Philadelphia 3. Price, $4.50.*

ALUMINUM SHEET AND PLATE INFORMATION. 320 pages. Tables show characteristics of aluminum and its alloys, practical data on design, fabrication and methods of joining and fastening. The book is divided into sections, one of which describes the process of producing sheet and plate. Completely indexed. *Kaiser Aluminum & Chemical Sales, Inc., Dept. RLC, 919 North Michigun Ave., Chicago 11. Price $5.00. Free when requested on company letterhead.*

Subscribers—Please Note

When inquiring about subscriptions—renewals, new orders, or questions concerning Locomotives and Cars—please include your city postal-zone number *always.* In order to cooperate with the Post Office Department in the delivery of your magazine, we *must* include the zone number for each subscriber's address in zoned cities.

ASTM STANDARDS ON PETROLEUM PRODUCTS AND LUBRICANTS (D-2).—Contains 188 distinct standards pertaining to petroleum products and lubricants, of which 43 are new, recently revised, or have had their status changed. Among major topics covered are measuring and sampling, crude petroleum, natural gases, butadiene, petroleum lubricants, diesel fuels, lubricating oils, turbine oils, etc. Thirteen proposed methods of test presented. *American Society for Testing Materials, 1916 Race st., Philadelphia 3. Price, $8.00.*

AAR LUBE AND FUEL OIL TEST MANUAL.—Mechanical Research Report MR-305—Locomotive Diesel Engine Lubricating Oil

(Continued on page 74)

Selected I.C.C. Motive Power and Car Statistics

• Freight Service

M211 Item No.		Month of December 1957	Month of December 1956	12 months ended with December 1957	12 months ended with December 1956
3	Road locomotive miles (000):				
3—06	Total, Diesel-electric	34,216	37,202	437,994	445,960
3—07	Total, electric	581	694	8,157	8,690
3—04	Total, locomotive-miles	36,004	41,361	471,870	503,956
4	Car-miles (000,000):				
4—03	Loaded, total	1,381	1,632	19,068	20,224
4—06	Empty, total	993	986	11,598	11,335
6	Gross ton-miles-cars, contents and cabooses (000,000):				
6—03	Total in Diesel-electric locomotive trains	99,640	107,476	1,294,911	1,289,444
6—04	Total in electric locomotive trains	1,782	2,130	25,791	27,021
6—06	Total in all trains	105,594	119,536	1,405,093	1,457,311
10	Averages per train-mile (excluding light trains):				
10—01	Locomotive-miles (principal and helper)	1.02	1.02	1.02	1.03
10—02	Loaded freight car-miles	40.6	42.3	43.1	43.1
10—03	Empty freight car-miles	29.2	25.5	26.2	24.1
10—04	Total freight car-miles (excluding caboose)	69.8	67.8	69.3	67.2
10—05	Gross ton-miles (excluding locomotive and tender)	3,106	3,097	3,176	3,103
10—06	Net ton-miles	1,353	1,401	1,439	1,422
12	Net ton-miles per loaded car-mile	33.3	33.1	33.4	33.0
13	Car-mile ratios:				
13—03	Per cent loaded of total freight car-miles	58.2	62.3	62.2	64.1
14	Averages per train hour:				
14—01	Train miles	19.3	19.1	18.8	18.6
14—02	Gross ton-miles (excluding locomotive and tender)	59,486	58,366	59,186	57,071
M240 Item No.					
14	Miles per Diesel-electric unit day:				
14—01	Road freight units	191.3	—	207.1	—
14—02	Road passenger units	445.0	—	439.1	—
17	Car-miles per freight car day:				
17—01	Serviceable	41.3	45.8	45.6	46.8
17—02	All	39.4	44.2	43.7	45.0
18	Average net ton-miles per freight car-day	763	913	906	953
19	Per cent of home cars of total freight cars on the line	111.3	111.1	110.7	111.9

• Passenger Service

M213 Item No.					
3	Road motive-power miles (000):				
3—06	Diesel-electric	19,682	21,010	232,694	243,138
3—07	Electric	1,112	1,323	13,572	14,969
3—04	Total	21,083	22,874	249,824	266,505
4	Passenger-train car-miles (000):				
4—08	Total in all locomotive-propelled trains	224,899	247,098	2,567,683	2,766,315
4—11	Total in Diesel-electric locomotive trains	208,892	225,917	2,376,615	2,517,888
12	Total car-miles per train-mile	10.14	10.36	9.76	9.93

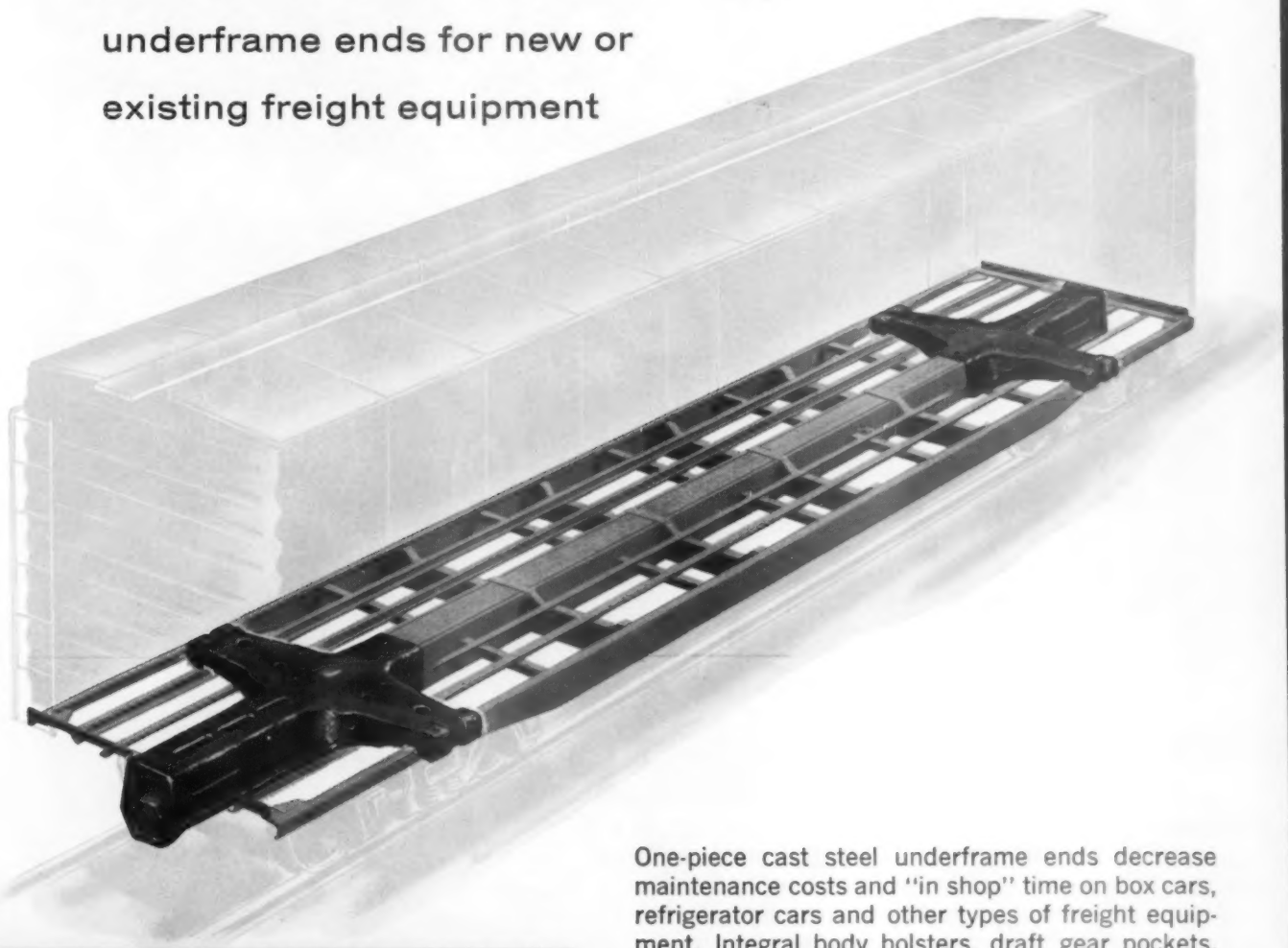
• Yard Service

M215 Item No.					
1	Freight yard switching locomotive-hours:				
1—03	Diesel-electric[1]	3,524,949	3,871,394	44,964,107	45,754,194
1—06	Total	3,594,706	4,088,883	46,729,872	48,890,638
2	Passenger yard switching hours:				
2—03	Diesel-electric[1]	253,752	268,341	2,888,934	2,982,564
2—06	Total	282,411	302,492	3,222,644	3,385,832
3	Hours per yard locomotive-day:				
3—02	Diesel-electric	13.9	15.6	15.1	15.7
3—05	Serviceable	14.5	15.6	15.4	15.7
3—06	All locomotives (serviceable, unserviceable and stored)	13.1	14.5	14.2	14.4
4	Yard and train-switching locomotive-miles per 100 loaded freight car-miles	1.80	1.72	1.70	1.68
5	Yard and train-switching locomotive-miles per 100 passenger train car-miles (with locomotives)	0.77	0.75	0.77	0.75

[1] Excludes B and trailing A units.

Where railroad progress is cast in steel....

Today—more and more
railroads order Commonwealth cast steel
underframe ends for new or
existing freight equipment



One-piece cast steel underframe ends decrease maintenance costs and "in shop" time on box cars, refrigerator cars and other types of freight equipment. Integral body bolsters, draft gear pockets, strikers, coupler carriers and center plates provide many advantages for new or rebuilt cars.

- eliminate body bolster failures
- increase car life
- provide greater strength at draft lugs
- resist rust and corrosion
- meet AAR code for interchange

Here is a proved way to get longer freight car life with reduced upkeep costs—now in service on many progressive railroads.

In rebuilding an existing box car, a cast steel underframe end is readily fitted into place.

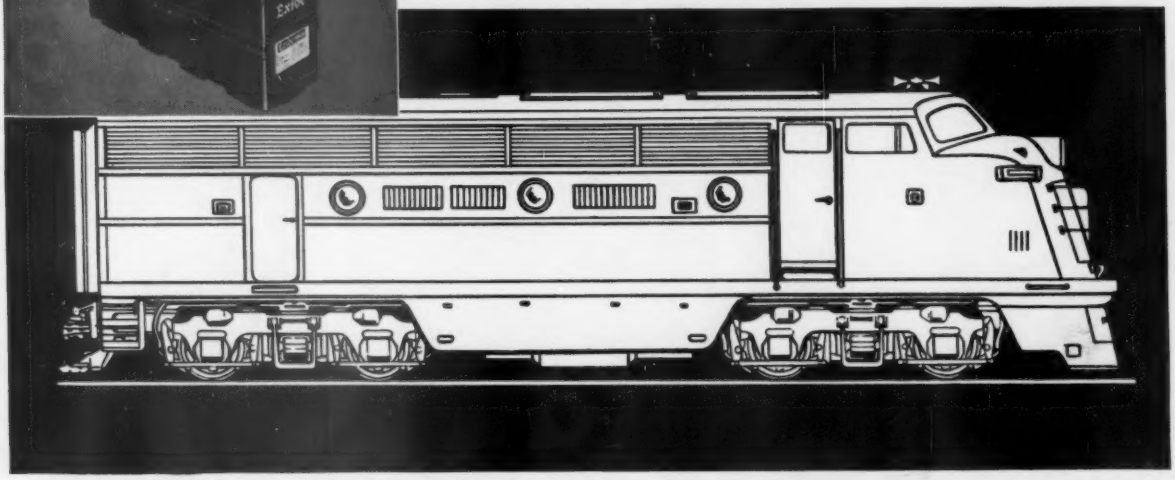
GENERAL STEEL CASTINGS

GEARED TO PROGRESS
RPI MEMBER

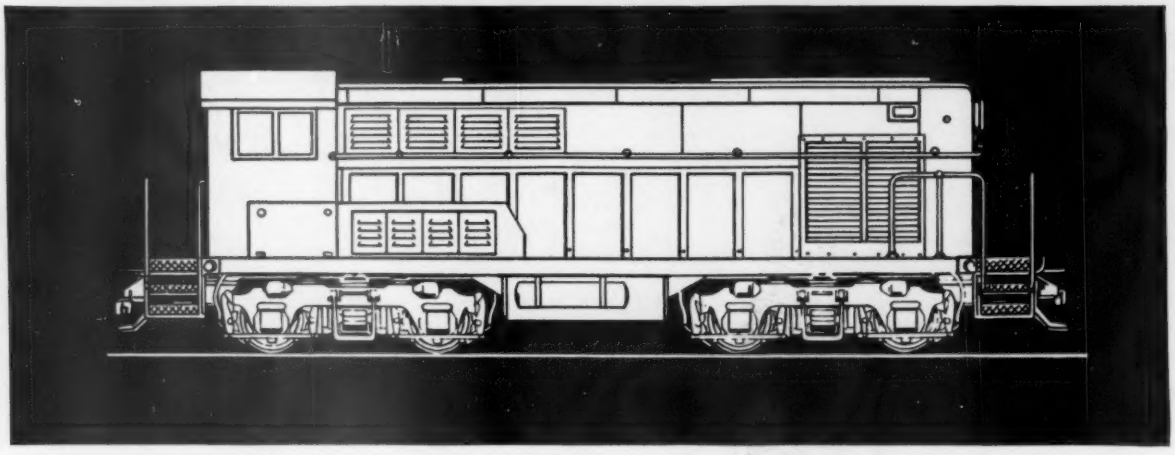
GRANITE CITY, ILL. • EDDYSTONE, PA. • AVONMORE, PA.

VERSATILE NEW BATTERY

New MGD Exide-Ironclad Diesel locomotive battery



Power for Road Types



Fits Switchers

Here's a battery you can use interchangeably in either of these two basic locomotive types. The new MGD Exide-Ironclad gives you far greater freedom and economy in using your available batteries. Its more efficient design packs more power into the same space. So your new MGD 420 amp-hr battery for road locomotives has the same physical dimensions as present 280 amp-hr batteries, such as are used in switchers.

Make sure you get this MGD Exide-Ironclad versatility next time you buy batteries. New design means actually superior performance and longer life. Saving in materials means extra economy. Beyond question, here is today's outstanding value in a diesel locomotive battery. Write for detailed bulletin. Exide Industrial Division, The Electric Storage Battery Company, Philadelphia 2, Pa.

Exide®

WHY 20 ROADS ARE TESTING NATIONAL CARTRIDGE BEARINGS

Combines the ruggedness of the solid bearing with the advantages of a sealed unit — at a much lower cost!

That's the reaction we've been getting from the twenty railroads now testing the National Cartridge Bearing . . . a truly rugged, completely sealed and self-lubricated bearing—*at much lower cost than roller bearings.*

With its large 270° bearing surface, tough bronze parts, simple construction, and flat back design, the National Cartridge Bearing is far better able to stand up to impact than roller bearings.

The unit is so effectively sealed that it can go for months between oil checks. In the meantime no other inspection is needed. Cars equipped with the National Cartridge Bearing can be dumped without losing a drop of oil.

Installation is a cinch too. Only five simple parts and seven screws to the entire assembly. Slips on and off in a hurry, without need of special tools or facilities. Fits inside of the standard journal box after the dust guard well has been removed . . . or under pedestal side frames, either narrow or wide jaw, with the use of simple adapters.

It's easy to see why twenty roads are testing the National Cartridge Bearing—it looks like the journal bearing of the future!

A-712

AMERICAN **Brake Shoe** COMPANY

RAILROAD PRODUCTS DIVISION
530 Fifth Avenue, New York 36, N. Y.


SINCO
CAR OIL
#355

A Revolutionary New Premium-Type Car Oil to Help You Cut Costly Delays Due to Hot Boxes

Field and Laboratory Tests Prove that Sinco Car Oil #355, Compounded from Natural High Quality 100 Plus V.I. Oils (No V.I. Improver), Gives You Important Advantages.

1. All-weather protection – will not congeal in cold weather nor thin out under heat.
2. Better oil cushion between bearing and journal.
3. More rapid flow through waste or pad to guarantee instant lubrication.
4. Anti-rust and oxidation inhibited.

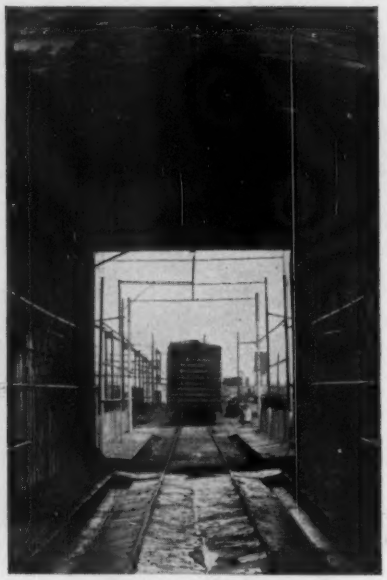
For additional information, contact Sinclair Refining Company, Railway Sales, 600 Fifth Avenue, New York 20, New York.
Chicago • St. Louis • Houston.

SINCLAIR Railroad Lubricants

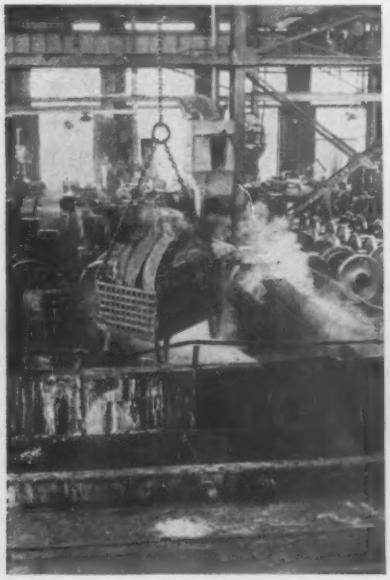
HERE ARE WYANDOTTE CLEANING

About 15¢ per unit for exterior diesel cleaning (machine washing). With an automatic washer and using WYANDOTTE-75, your diesels will be sparkling clean in just 1½ minutes per unit.

Only $1.35 per passenger diesel unit interior, using WYANDOTTE-30. No back-breaking labor. No costly hand wiping with Wyandotte spray-on, spray-off method. Units are sparkling clean, oil-free.

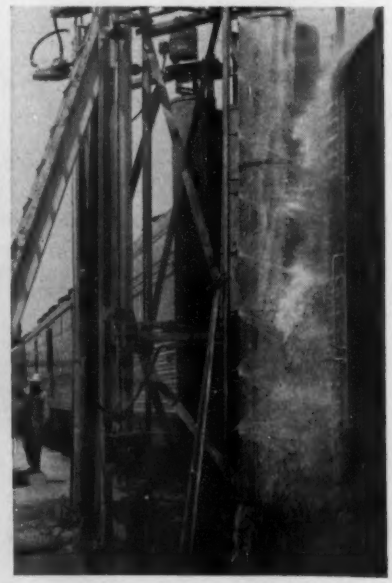


For less than $7, and in less than 8 minutes, WYANDOTTE-21 strips all paint from a boxcar. This cost includes stripper, labor, phosphatizing, and *all* other costs. Stripping tunnel is used; no hand labor.



Just 2½¢ to vat-clean a ton of ferrous parts with WYANDOTTE-11. This cleaner has good emulsifying characteristics, long service life, 100% solubility in water, controlled uniform quality, and low use-cost.

Only 3¢ to vat-clean a ton of aluminum parts with WYANDOTTE ALTREX.® You'll get a better cleaning job, and a faster one, with ALTREX. Compare this cost with that of any other cleaner on the market.



Just 13½¢ and one minute clean exterior of a passenger car (machine washing). Using WYANDOTTE-85, your cars stay bright and clean without paint damage. WYANDOTTE-85 is well inhibited, too!

COSTS--WHAT ARE YOURS?

Take a look at your cleaning operations—see if Wyandotte might help you clean better, faster!

The true measures of an efficient cleaning operation are actual results and unit-cleaning costs—not the price-per-pound of the cleaning product.

Because cleaning is our business, and because of long experience in the railroad field, we have developed cleaning products designed to give you better results—save you *time and labor*, and do a better job.

Equally important, Wyandotte cleaning methods assure you of the maximum from your maintenance personnel and equipment, and positively establish a more efficient operation for you at use-costs equal to or less than those shown.

Dealing with Wyandotte brings you benefits—in both effective products and helpful services—that could only come from the resources, research, and know-how of the largest supplier of specialized cleaning and washing products for business and industry.

Use Wyandotte's cleaning service. It gets results—saves time, saves dollars!

Your Wyandotte cleaning specialist is assigned permanently to your line. He devotes his time to improving your cleaning in any local area or on a systemwide basis. Thus, he coordinates his activities with the requirements of your mechanical, purchasing, and test departments.

Get more details by writing us today! *Wyandotte Chemicals Corporation, Wyandotte, Michigan. Also Los Nietos, Calif. Offices in principal cities.*

Wyandotte CHEMICALS

REG. U. S. PAT. OFF.

J. B. FORD DIVISION

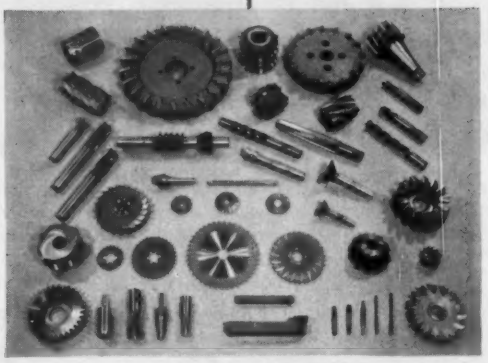
COMPLETE LINE OF CLEANERS FOR ALL RAILWAY NEEDS

Cincinnati No. 2

Rear left-hand working position is the most convenient for grinding plain helical tooth cutters on CINCINNATI No. 2 Cutter and Tool Grinders.

. . . accurately grinds just about every cutter in the shop

CINCINNATI



Wide range and variety of cutting tools which may be accurately ground on a CINCINNATI No. 2 Cutter and Tool Grinder.

CINCINNATI No. 2's give you the opportunity to attain two desirable objectives in your cutter maintenance program: 1) Cutters of any size and type, ranging from small end mills no bigger than a pencil to heavy 18" diameter face mills, can easily be ground on these machines. 2) Cutters are quickly and accurately restored to top cutting trim. ¶ Check these advantages of CINCINNATI No. 2 Cutter and Tool Grinders against any other equipment within their range:

Anti-friction ball bearing table slide, with hardened and ground ways

Four operating positions, with both mechanical and electrical controls at the operator's fingertips

Vertically adjustable wheelhead pile, with eccentrically mounted wheelhead to gain extra range

There are many other reasons why you should choose Cincinnati for all your cutter grinding requirements. A few are outlined in Sweet's Machine Tool File. More information in catalog No. M-2004. May we send a copy to you?

THE CINCINNATI MILLING MACHINE CO.
CINCINNATI 9, OHIO

CINCINNATI No. 2 Cutter and Tool Grinder

Catalog No. M-2004

CINCINNATI®

MILLING MACHINES • BROACHING MACHINES • CUTTER AND TOOL GRINDERS • SPECIAL MACHINE TOOLS • METAL FORMING MACHINES HARDENING MACHINES • CUTTING FLUIDS • GRINDING WHEELS

Curves and grades cut CPR wheel life. Here the "Canadian" skirts north shore of Lake Superior on rugged Schreiber district.

CPR Proves AAR and Budd Were Right

Complete records, along with the staff and facilities for making special studies, frequently pay off for the Canadian Pacific. This has been the case in a wheel wear investigation completed recently. The records system was set up in 1954 as part of a preventive maintenance program for a fleet of 173 stainless-steel passenger cars.* Let's look at the way this complete data has been used in investigating the wheel problem.

When the 173 cars were ordered from the Budd Company the class of wheel applied had to be settled. Class "BR" wheels were the existing standard for passenger service on the Canadian Pacific, but the Budd Company recommended class "CR" wheels.

Both the BR and CR types are manufactured under AAR specification M-107. Both types are heat-treated, multiple-wear, wrought-steel wheels. The only difference in chemical composition is that the "C" wheel has a higher carbon content and consequently its heat-treated surfaces are usually harder. The AAR specification tells exactly what each of these wheels is intended to do. Class B, says the specification, is for "high-speed service with severe braking conditions and higher wheel loads." The class C wheel is for "(*1*) service with light braking conditions and high wheel loads, or (*2*) service with heavier braking conditions where off-tread brakes are employed."

The whole subject of BR and CR wheels used on passenger cars has been a very controversial one with American railroads. Class BR wheels had given good service in passenger service on the Canadian Pacific under extreme weather

*This preventive maintenance system and its records were described in Railway Locomotives and Cars, August 1957, p 35, and September 1957, p 46.

Here's What the AAR Says . . .

AAR Specification M-107-56: Wheels, Multiple-Wear Wrought Carbon Steel, Untreated and Treated

1. SCOPE (a) These specifications cover multiple-wear wrought carbon steel wheels for locomotives, tenders, and cars—one Class U, untreated, and three classes (A, B and C) of heat-treated wheels.

(b) The service for which the various classes are intended generally is as follows:

Class U—General service for which an untreated wheel is satisfactory.

Class A—High speed service with severe braking conditions, but with moderate wheel loads.

Class B—High speed service with severe braking conditions and higher wheel loads.

Class C—(1) Service with light braking conditions and high wheel loads, or (2) Service with heavier braking conditions where off-tread brakes are employed.

8. CHEMICAL COMPOSITION:	**WHEEL CLASS B**	**C**
Carbon	0.57 - 0.67	0.67 - 0.77
Manganese	0.60 - 0.85	0.60 — 0.85
Phosphorus (not over)	0.05	0.05
Sulfur (not over)	0.05	0.05
Silicon (not less than)	0.15	0.15
11. BRINELL HARDNESS		
Minimum Rim Hardness	277	321
Maximum Rim Hardness	341	363

18. MARKING (b) The marking to designate the class and method of heat treatment . . .
BR—Class B, rim treated.
CR—Class C, rim treated.

Day by Day Reports . . .

Day-by-day reports of wheels removed at terminals and of wheels scrapped at the Montreal wheel shop, where all this work is done, give CPR data to build up into complete wheel records.

CANADIAN PACIFIC RAILWAY COMPANY

OFFICE OF CHIEF OF M.P. & S.S.

M.P. 817

January, 1955

MONTHLY WHEEL REMOVAL RECORD ON STAINLESS STEEL PASSENGER CARS

MONTH OF May, 19 55 STATION Toronto Union FOREMAN General Car Foreman

CAR NAME OR NUMBER	DATE OF WHEEL CHANGE	PEDESTAL LOCATION	REMOVED WHEEL NUMBERS	REASON FOR REMOVAL	REMOVED BOLDERON NO.	BOLDERON SETTING WHEN REMOVED	INSTALLED WHEEL NUMBERS	BOLDERON NO. INSTALLED
3005	May 17th	RL-1 x	322 - 350	Rule FC7, 71E	B-3615	.030	20 - 40	B-3979
"	May 17th	RL-2 x	[illegible]					
Burton Manor	May 18th	RL-3 x	14 - 26	" " "	B-3926	.050	303 - 318	B-3615
Grant Manor	May 18th	RL-2 x	333 - 353	" " "	B-2817	.030	36587 - 36569	B-3642
Regent Manor	May 19th	RL-4 x	170 - 12	" " "	B-4211	.030	258 - 187	B-3761
Lorne Manor	May 19th	RL-3	228 - 237	Symbol 76T	B-3796	.045	198 - 214	B-3767
3013	May 20th	RL-1 x	216 - 224	Rule FC7, 71E	B-3816	.030	[illegible]	B-4213
Chateau Rouville	May 20th	RL-3 x	243 - 38	" " "	B-3774	.030	322 - 350	B-3794
Drummond Manor	May 21st	RL-1 x	236 - 290	" " "	B-3256	.050	[illegible]	
Kent	May 22nd	RL-2 x	3041 - 3065	" " "	B-4007	.030	3066 - 3067	B-3774
Osler Manor	May 22nd	RL-4 x	229 - "	"				
100	May 22nd	RL-4 x	3035 - 3814	"				
"	May 22nd	RL-2 x	3881 - 3894	"				
"	May 22nd	RL-1 x	3098 - 3078	"				
Chateau Maisonneuve	May 24th	RL-2 x	139 - 166	"				
Degrees	May 24th	RL-1	3898 - 3088	"				
Burton Manor	May 25th	RL-2	153 - 6	Defec				
110	May 26th	RL-4	3100 - 3855	Rule				
Miles Manor	May 29th	RL-1	260 - 281	Symbo				
102	May 29th	RL-3 x	3106 - 3060	Rule				
Chateau Brule	May 29th	RL-1 x	4 - 226	"				
Drummond Manor	May 30th	RL-3	250 - 718	Symbo				
Cornwall Manor	May 30th	RL-3	145 - 101	Defec				

MP-815

CANADIAN PACIFIC RAILWAY COMPANY
MONTHLY WHEEL SCRAPPING RECORD
DISC BRAKE EQUIPPED WHEELS

IDENTIFICATION NUMBERS OF WHEELS REMOVED FROM AXLE						SERIAL NUMBER OF WHEELS APPLIED	TAS OLD AXLE SCRAPPED
MONTH	YEAR	BRAND	SERIAL NUMBER	CLASS	HEAT TREAT.		
December 10th	1956	B	3098 - 60 - P - 509	C	R	P 86455 - 19199	R.R. T I M Ret to Ser.
"	"	"	3035 - P - [illegible]	"	"	" 86[illegible] - 19[illegible]	" " " " "
"	"	"	[illegible]	"	"	" 86480 - 19199	" " " " "
"	"	S	350 - 2 - 1416	C	R	" 86380 - 19201	" " " " "
"	"	"	322 - 2 - 1430	"	"	" 86505 - 19200	" " " " "
"	"	T	[illegible]	B	R	" 86601 - 19198	" T I M " " "
"	"	"	72315 - A - "	"	"	" 86295 - 19200	" " " " "

MONTH OF December 1956 19 WHEEL SHOP Car Machine Shop FOREMAN

Month by Month Summaries . . .

Month-end summaries of all wheel changes for Budd car fleet enable the railroad to know exactly what performance is, and in this case, to compare service given by two types of wheels.

WHEEL CHANGE-OUT RECORD FOR MONTH ENDING August 31, 19 57

STAINLESS STEEL PASSENGER CARS

SERIES	No. of Wheel Changes during month	NO. OF WHEEL CHANGE-OUTS FOR EACH SERIES OF CARS AND REASON FOR WHEEL REMOVAL ALSO PERCENTAGE OF DEFECTS FOR EACH SERIES TO TOTAL OF _____ CHANGE-OUTS SHOWN FOR MONTH												AVERAGE MILEAGE OBTAINED PER WHEEL CHANGE-OUT FOR MONTH SHOWN	REMARKS
		Shell Tread		Worn Flange		Skid Flats		Worn Tread		Built-up-Tread		Other Defects			
		No.	%	No.	%	No.	%	No.	%	No.	%	No.	%		
Baggage - Dormitory 3098 - 3017	6	2	1	4	3									108,699	
Dome Coaches Skyline - 500 - 517	21	4	3	14	10	1	.8					2	1	79,119	
DeLuxe Coaches 100 - 129	11	4	3	6	4							1	.8	124,578	
Diners	17	4	3	12	9			1	.8					73,836	
Roomette Sleepers Manor Series	31	10	7	19	14			1	.8			1	.8	81,028	
Duplex Roomette Sleepers Chateau Series	29	7	5	18	13			4	3					89,347	
Dome Observation-Lounge Park Series	24	6	4	12	9							6	4	53,065	
															Total Wheels wheels removed during month
TOTALS FOR MONTH	139	37	26	85	62	1	.8	6	4.6			10	6.8	AVERAGE MILEAGE PER WHEEL-CHANGE OUT FOR MONTH	13,854,883 30,959

TOTAL NO. OF WHEEL CHANGE-OUTS TO DATE

ALL CARS IN ALL SERIES	Total No. of Change-outs	Shelled Tread		Worn Flange		Skid Flats		Worn Tread		Built-up-Tread		Other Defects		AVERAGE MILEAGE OBTAINED PER CHANGE-OUT	REMARKS
		No.	%	No.	%	No.	%	No.	%	No.	%	No.	%		
	5023	2401	48	1981	39.4	52	1	271	5.3	2	.1	315	6.2	68,666	

OFFICE OF CHIEF OF MOTIVE POWER AND ROLLING STOCK AUGUST 1955.

Wheel service between changes and total wheel life for the two types of wheels are indicated.

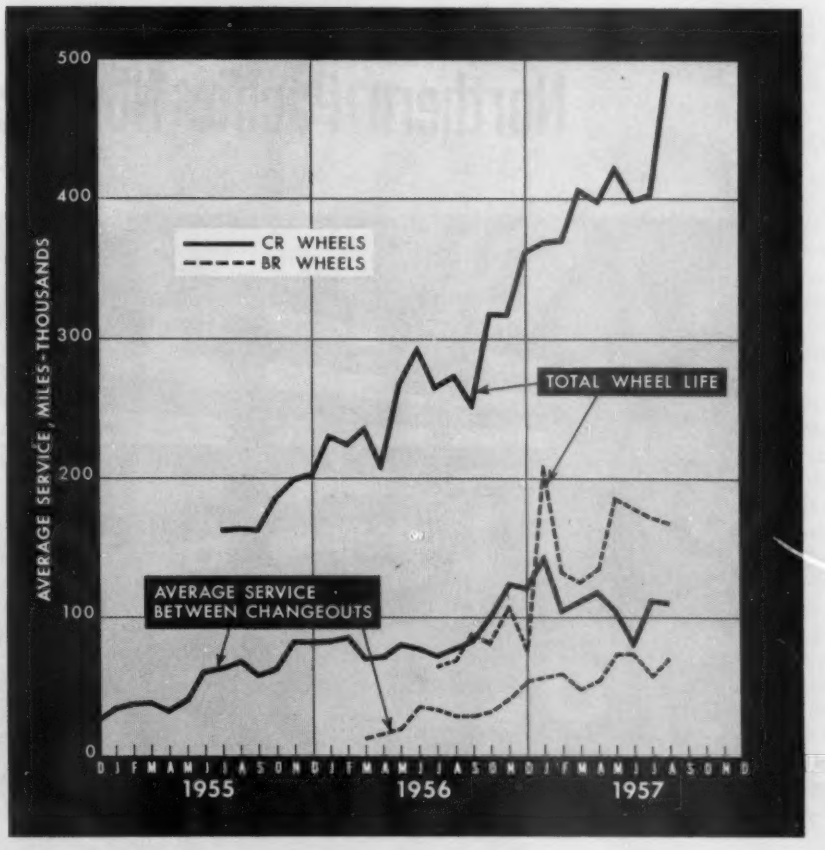
Produce These Records

CANADIAN PACIFIC RAILWAY COMPANY
MASTER WHEEL RECORD FOR BUDD EQUIPMENT

Wheel Set No's.	Applied to Car: Name or Number	Applied to Car: Date	Applied to Car: Car Mileage at Date Shown	Removed from Service: Date	Removed from Service: At Car Mileage Of	Removed from Service: Reason	Wheel Mileage Between Turnings
321-327	3010	DEC 13-54	460	MAR 8/56	15660	SHELL	15660
	HEARNE MANOR	MAR 10-55	12568	MAY 4/56	29663	SHELL	17095
	CARLETON "	MAY 8-55	28430	SEPT 3/56	15911	W.F.	90682
	DUFFERIN "	SEPT 6-55	123456	JAN 31/56	200335	SHELL	76879
	ANNAPOLIS	FEB 3-56	252892	FEB 24/56	267592	SHELL	14700
						TOTAL	215016
					REPLACED	BY	
					71881-72071		
	WHEEL SET FIRST INSTALLED DEC-13-54				SCRAPPED MAR 21/56 ANGUS		
322-350	3005	NOV 17-54	460	MAY 17/56	29357	SHELL	29357
	CH. BOUVILLE	MAY 20-55	124081	SEPT 0-56	209574	W.F.	85493
	FRASER MANOR	SEPT 11-55	151552	FEB 19/56	250262	W.F.	98710
	PRINCESS	FEB 24/56	241070	DEC 4/56	455225	W.T.	214155
						TOTAL	427715
					REPLACED	BY	
					R6303-R6380		
	WHEEL SET FIRST INSTALLED NOV-17-54				SCRAPPED DEC-17-56-ANGUS		

Records for the individual wheel sets are on this page from master record. Wheel set is identified by wheel with lowest number. Mileages come from transportation department, other data from shops.

Show These Results



conditions. However, when off-tread braking was specified for the Budd passenger cars, it was decided to accept class CR wheels.

All of the 173 CPR cars were equipped with Budd's CF disc brakes. The cars were all built in Philadelphia and were equipped with CR wheels from U. S. mills. The Canadian Pacific decided to compare the life of BR and CR wheels under the Budd passenger cars and set up detailed records of wheel wear and wheel life. The BR wheels were introduced at wheel changes when the original CR wheels wore out.

The first car was delivered to the Canadian Pacific in July 1954 and the final car arrived nearly a year later. In December 1954 the CPR began to produce figures on wheel life. By July 1955 the first of the original CR wheels was being scrapped. All of the wheels applied to these cars since they arrived in Canada—both BR and CR—have been manufactured in England, but comply fully with AAR specifications.

Average life for the first five wheels scrapped in July 1955 was 162,959 miles. Already Budd had been called in because of the short service the wheels had been yielding between turnings. During their first months, this had been averaging less than 40,000 miles between trips to the drop pit.

One solution to this low mileage problem involved correction of erratic Rolokron action. Permissible tolerance in the Rolokron gap setting was reduced and these are now all set at 0.030 in. (plus or minus 0.005 in.). Soon service between turnings was averaging over 60,000 miles. Further work on the Rolo-

Car Class and Equipment		Wheel Sets Changed to Sept, 1957	Total Mileage	Average Mileage Per Change
"R" Series Sleepers 8-Sec, 2-Cpt, 1DR 6-Wheel Trucks Clasp Brakes BR Wheels Weight—184,000 lb		65	2,865,593	44,086
"U" Series Sleepers 14-Section 6-Wheel Trucks Clasp Brakes BR Wheels Weight—190,000 lb		474	31,503,791	66,463
"Grove" Series Sleepers 10-Rmt, 5-DBR 4-Wheel Trucks Clasp Brakes BR Wheels Weight—136,000 lb		71	4,482,821	63,138
Budd Cars Various Types 4-Wheel Trucks Disc Brakes CR and BR Wheels Weight—119,100 to 145,400 lb	Total	5,023	344,910,547	68,666
	BR	1,222		51,818
	CR	3,801		76,973

kron led to the replacement of all the coils with a new type coil and produced a further increase in wheel service.

Soon after this—with CR wheels averaging about 80,000 miles between changes—the first BR replacements went into service. In no month since they have been used have these BR wheels ever equalled the performance of CR wheels. This is the case in mileage between turnings and is even more pronounced in total wheel life.

Total wheel life of both classes of wheels in general has been limited by flange wear and by shelling. To restore the contour to wheels with sharp flanges requires the removal of much more metal than is removed in eliminating a "shell-out." Because BR wheels are softer, they develop sharp flanges quicker in the same service.

This is demonstrated in cumulative CPR figures to last September:

	Class BR	Class CR
Total wheel sets changed	1,222	3,801
Shelling	39%	51%
Sharp flange	49%	36%
Average mileage per changeout	51,818	76,793
Total wheel sets scrapped	179	948
Average total mileage	137,000	254,000

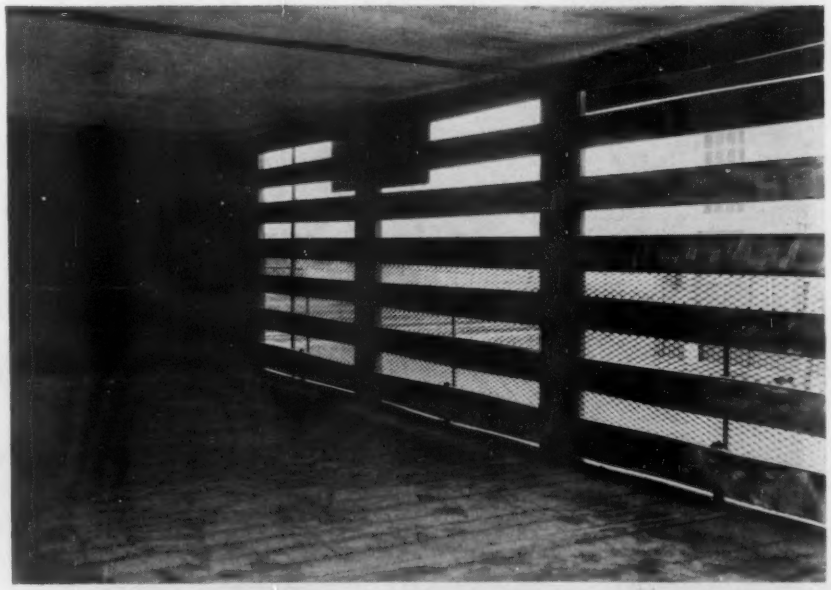
Even the complete wheel records which the Canadian Pacific has developed disclose no correlation between wheel wear and car weight, location under the car or in the train, or with axle drives. In one case, Brinell hardness readings were made on two sets of CR wheels which had shown wide variation in mileages between turnings. There was no measurable difference in hardness between the set of wheels which operated over 200,000 miles and the other set which ran off only 15,000 miles before it had to be dropped.

Some studies of the BR wheels under older standard and lightweight sleepers were made. These studies showed that the CR wheels used on disc brake equipped cars were superior to the BR's used under the older type cars even though the service in which the stainless steel cars operate is probably the most rugged on the CPR. On another occasion the Canadian Pacific did attempt to develop life of disc brake shoes. It was found that mileages obtained were as high as 200,000 miles on some shoes. Insufficient data prevented comparisons.

In the case of the two types of wheels, however, the answer seems well proved. Its figures have convinced the Canadian Pacific that the CR wheel is the type for its disc brake equipped stainless-steel cars.

Tests indicate conclusively that CR wheels on Budds with off-tread braking give longer life than BR wheels in similar service.

Northern Pacific Now Has



Bottom deck—slats open. All metal construction eliminates splinters and protruding nails.

Shutter panel slides easily into position, and locks with retaining pin. Housing at bottom center contains counterbalance springs.

Northern Pacific's "happy porker" car with slats closed ready for winter operation.

GENERAL DIMENSIONS

Length inside, ft-in.	40—9
Length over end sills, ft-in.	40—9 1/2
Length over striking castings, ft-in.	42—1 1/2
Width inside, ft-in.	9—4
Width of side door openings, ft-in.	5—1 1/4
Height inside, top deck, ft-in.	5—1 5/16
Height inside, bottom deck, ft-in.	5—2 3/16
Height of side door openings, top deck, ft-in.	4—4
Height of side door openings, bottom deck, ft-in.	4—7 5/16
Height, top of rail to running board, ft-in.	15—2 1/4
Light weight, lb	49,000
Capacity, lb	80,000
Capacity, cu. ft.	3,922

'Pig Palace' Cars

New double-deck, steel stock cars are rolling off the assembly line at N.P.'s Brainard, Minn., car shop. Converted from automobile cars originally built in 1929, these 200 cars are said to be the first to provide closing of openings between slats to protect animals in cold weather. The interior body slats are made of steel instead of conventional wood. Metal shutters arranged in panels on the outside of the car are manually adjusted for complete or partial closure of the space between body slats. This eliminates the need for coopering or lining cars with cardboard. The flexibility of the shutters will provide adequate protection in case of unexpected changes in weather during transit.

The steel underframe, ends, roof and running boards on the automobile cars were left in place. Doors, steel side framing and all wood was removed. The side, corner and end posts, made from the steel side framing are spaced to divide the car side into six panels. Each panel is 5 ft, 5 in. wide, and extends vertically from the side sill to the roof. The body slats, 5½ in. wide, extend the length of car and are spaced 4 in. apart from bottom to top and welded to the posts.

Each panel is equipped with a sliding panel or shutters of formed metal slats, 4½ in. wide, and in number equal to the number of openings between the body slats. The sliding panels are counterbalanced with two springs, enclosed in a telescopic housing mounted on each side of the panel at the side sill. The shutters are normally open. In this position the springs are compressed and the slats are in alignment with body slats. The assembly is held in this open position with a retaining pin. To close the opening between body slats, the pin is removed and a handle at the bottom of the panel plus the force of the springs moves this panel upwards. The pin is then reinserted in a locking bar.

Coarse wire mesh screen covers the bottom three openings on each level. On the interior of the car, the mesh, body slats and ends are coated with latex Insulmat, $\frac{1}{16}$ in. to $\frac{3}{32}$ in. thick. This to prevent adhesion of animal flesh to the metal in cold weather. Top and bottom decking is tongue-and-groove fir, 2⅜ in. thick, the only wood construction in car. The Dalman trucks are equipped with Timken roller bearings, 33-in. one-wear wrought- or cast-steel wheels, and Holland E-2 volute snubber springs. W. H. Miner FR-16 and Cardwell-Westinghouse R-20 draft gears are used.

The exterior sides of car are painted brown and underframe and trucks black. To reflect the heat of sun during summer months, the ends, roof, and running board are painted aluminum.

The cars will be used principally in hog shipments from the Midwest to the Pacific Northwest.

Burlington's Shop Saves Time . . .

Power Assembly Overhaul Is One-Level Operation

Power assembly overhaul is performed at varying intervals on each Burlington diesel unit in the road's West Burlington, Iowa, shop. Engines are removed from the locomotive units for this work. The "Q" has found that working these engines on the shop floor releases overhead cranes for other work, reduces repair time, and makes engine work easier and safer.

Once out of the carbody, engines are moved to the adjoining heavy machine bay for disassembly. At post locations are ¾-ton electric hoists which facilitate parts removal. Parts reclamation work areas are connected with conveyors.

Eight men are assigned to an engine, each with a definite work position. Their responsibilities are to remove the foundation bolts, and then follow the engine to the floor where parts are removed and disassembled. Following this, replacement assemblies are applied and engine is returned to the unit. It takes about 2½ hrs to remove an engine, and two 8-hr days for the complete overhaul operations. While the work described here is performed mainly on EMD power, similar simplified procedures are followed on Alco and Baldwin units.

Each power assembly—head, piston, liner and connecting rod—is removed as a unit at the engine repair station. All parts of this assembly go first to the lye vat for cleaning after being placed in vat boxes which are handled by shop tractors and trailers. The lye vat is located outside to keep undersirable fumes and odors from the main shop. After cleaning, two men remove the head from the liner, and the head is stripped of its valves, springs and keepers. Rods are separated from the pistons and wrist pins and bushings are removed. Rings removed from the pistons are scrapped. Wrist pins are put in a separate container and sent to the small engine parts cleaning room. There they go through a cleaning solution, are inspected and checked for wear, and are then either returned to service or scrapped. No reclamation is done on wrist pins.

On Our Cover . . .

Diesel engine repair shop at West Burlington, Iowa, is the area where engines are placed after they are removed from locomotives. Parts removed here are then transferred to the adjacent heavy machine bay (shown above) where the processes described in this article take place.

Liners

Liners removed from the lye vat are placed eight on a special trailer for sand blasting. Water ports on the C liners are protected by steel plates, and liners with lower seals have the seals left in place for this operation. After being returned to the conveyor line, they are checked and marked for rebore, honing or scrapping. Ridge reaming is not done. Instead, rebore operations are based on 0.030 in. and 0.060 in. oversizes, then the liner is scrapped. Liners worn about 0.004 in. are honed. In this case, the port relief zone is not touched. Liners are then wiped clean, lower seals removed (upper seals are left on for a water test), and they are moved on the conveyor to an American Pace Maker lathe adapted for boring. The boring bar is equipped with a spring-loaded

Liner reclamation is handled in the area at the center. Behind and to the right is the conveyor system for heads. Post cranes and tramrails facilitate materials handling at various steps in the processes.

roughing and finishing tool, and does the job in one operation, including the port relief. No honing is done after boring. The next operation is an 80 psi water pressure test. Following final cleaning, studs are inspected and checked for length. All seal surfaces are wire brushed. The edges of holes on the inside of the port relief zone are chamfered, and the new size is restenciled on the liner. From here they go to assembly. The present output of rebored liners is 16 per day.

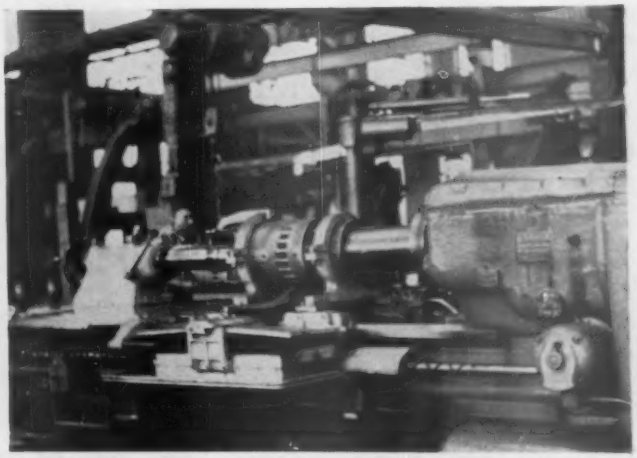
Heads

After cleaning, heads are returned to the cylinder head department where they are unloaded and placed face down on a trailer for sand blast. Each trailer holds ten heads and is tractor handled. Cleaned heads are inspected and those with cracks go to the welding booth.

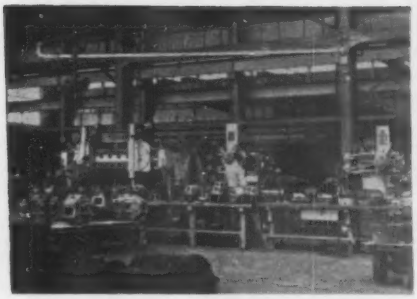
In handling heads not requiring welding, a reamer is run through the valve guides, and the relief valve hole is redrilled and retapped. Heads meeting a pressure test of 80 psi go to a drill press for recutting of the valve seats to proper clearance. Next operation is on a boring mill where the upper head seal groove is polished and the head is faced if necessary. The railroad has developed its own standards in maintaining the proper distance between the face and head retainer seat, if the head is faced.

A lapping operation follows. The work is done on a 54-in. Putnam boring mill with an adapter table having fixtures to lap seven heads at once. The fixture is designed to impart a rotary motion to

Engine assembly area is equipped with cranes which make it unnecessary to use the overhead cranes during assembly or tear-down.

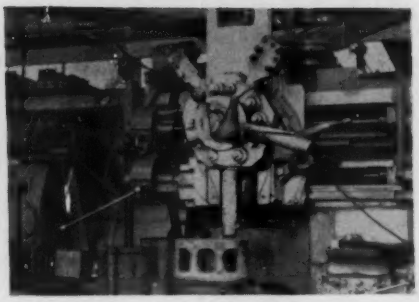


Spring loaded boring bar equipped with both roughing and finishing tools makes a one-pass operation of the liner re-finishing.



Head conveyor line connects the various reconditioning stations. Sequence of these operations is from right to left.

Special jig holds EMD head for the redrilling and tapping of the relief valve hole. Burlington has installed much special tooling.



Upper head seal groove is polished at this station. The head is faced here if that is necessary.

heads while the table revolves. During this time, the operator inspects studs and the injector well seats on other heads on a bench. After lapping, the heads are wire-brushed, and a final pressure test is given. The heads then move by conveyor to the valve-seat grinding operation. Two oscillating, Hall-Toledo, valve-seat, hand-type grinders produce thirty-five heads per day. With an additional man on the grinder, fifty heads can be turned out.

The final station is assembly of valves, springs and locking collars with a hydraulic spring compressor in one operation. The completed heads can either be used immediately or sent to the storeroom.

Cracked heads have the cracks melted out and welded with Heliarc equipment. All studs are removed before welding. The heads are preheated to 1,400 to 1,450 deg F in a lined circular metal box applied to a welding positioner. The box is supplied with covers having various openings to match the location of cracks. The positioner can be tilted at any angle to facilitate welding. After welding, the heads go through the drill press and boring mill operation on machines assigned to handle repaired heads. They are then placed on the regular production line conveyor for lapping and subsequent operations.

Pistons

Pistons from the lye vat are sorted by size, placed in lift truck skips in quantities of thirty-six, and brought to the repair line for visual inspection and pressure test. In the next operation, the pistons are mounted in a lathe and given a 5-min rotary wire brushing. This is followed by checking and cleaning grooves, and then removing shoulders on an adjoining lathe. Where groove width exceeds manufacturer's wear limits, the piston is scrapped. Cleaned and inspected pistons are magnafluxed and made ready for assembly with repaired liners.

The piston carriers are also cleaned and inspected. If the pilot on the carrier is worn, it is metallized and finished. A new bushing is applied, rough turned and broached with a shop-made tool made from a steam locomotive wrist pin. The broach is pushed through the bushing under hydraulic pressure. The bushing is then finish bored to size.

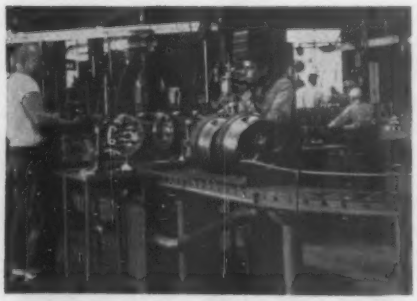
Connecting Rods

After rods are cleaned and Magnafluxed, they are trucked to the diesel engine department and placed in racks. The floating bushing is applied and each rod is checked for length, straightness and slipper surface. Each basket is kept with its rod. Metal spray is used to restore baskets to size. This is followed with a ground finish to assure correct length of the rod and fit on the bushing. The rods then move to assembly where all power parts are assembled and placed in wooden racks holding either four or six complete power units. These are handled by a crane to floor engine locations. Book records are kept in the assembly department showing the serial numbers of the engines, size of liners, pistons, heads, whether parts are new or reclaimed, date of repair, and other information.

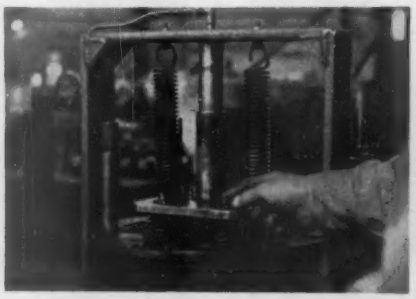
Engine Lubrication

When necessary to remove power assemblies at maintenance points, the injectors and connecting rods are also changed out, rocker arms are inspected, and lash adjusters and wrist pins renewed if necessary. Replacement assemblies are furnished from West Burlington and parts removed are returned for reclamation or scrap.

A straight mineral base lube oil is used in Burlington passenger and freight engines. This oil is changed at 48,000 and 40,000 mile intervals respectively. Blotter tests and spectograph analyses are not done. The oil removed is reclaimed. Samples are then checked in the laboratory at Aurora, Ill., and reclaimed oil is generally re-used in all classes of power.



Conveyor brings the heads to the valve seat grinding station. The two grinders can turn out 35 heads per day.



Valves, springs, and locking collars are assembled at this station with a shop-made hydraulic machine.

Pistons are wire-brushed at the back. The other machine removes shoulders and cleans up ring grooves.

Virginian's newest hoppers are 41-ft over striking castings. The cars have 31-ft truck centers and have an inside width of 9-ft 9 in.

Goals of Virginian's Hopper Design

Pocahontas coal hauler's shop has had orders for 3,300 of these cars; Bethlehem built 500 cars of the same type for the Virginian last year.

In common with the other coal-handling railroads of West Virginia and Kentucky, the Virginian has been increasing its car fleet to meet the demands for export coal and to be ready for greater domestic consumption. A substantial portion of the coal which the Virginian loads for these markets will go into its newest hoppers—the road's class H-14. These 70-ton cars are not replacing older hoppers on a car-for-car basis. Actually many of them will be giving the Virginian greater coal-hauling capacity by swelling its hopper ownership.

The first of these cars was completed in 1955. By the spring of 1958 the Virginian shop at Princeton, W. Va., had completed almost 2,300 of the H-14's. Recently the Bethlehem Steel plant at Johnstown, Pa., built 500 of these cars for the Virginian.

The design for these hoppers is the Virginian's own. It was completed by the mechanical department in 1955. Two cars of the initial 300 built early in 1956 were tested at the Technical Center of the National Malleable & Steel Castings Co. in Cleveland during that summer. These tests proved the strength of the cars and no changes have been made in the design of subsequent cars as a result of these impact tests. In service the cars have not operated long enough for the road's mechanical officers to say positively that there will be no weak points. But, all the experience of a railroad which has operated thousands of open-top cars of all designs and capacities went into these H-14's.

The Virginian aims at providing maximum corrosion resistance in the bodies of its cars. This has been accomplished by using low-alloy high-tensile steel body plates. Another means for reducing corrosive attacks is to have as few holes and lapped joints as possible in the floors of the cars. This means that most of the attachments between the body and underframe are through welded connections. It also means that sides, floors and hoppers are all welded to each other. With the aim of keeping structural members from contacting the lading, the Virginian has utilized outside side stakes. These stakes, instead of being the conventional pressings, are channels bent back through 180-deg. This means that the two flanges of the channel contact the car side and it is through both flanges that the stake is riveted to the sides. This type of stake does not have the reduced section at bends associated with more conventional stakes.

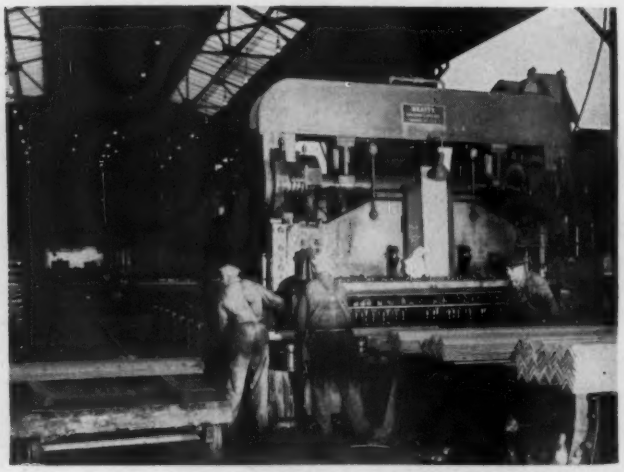
The fact that the side stakes are not pressed is indicative of another feature of these cars. The hopper doors are the only pressings used. The remainder of the car body and underframe is composed almost entirely of flat plates and straight structural sections. Only a very few plates have to be offset during fabrication for the building of these cars. Crossridge sheets, one-piece longitudinal hood and inside hopper sheets, and the one-piece upper floor and end sheets do require several fabricating steps.

The Virginian uses the AAR 51.2-lb center sill section. The completed center sill has a minimum of holes in it for the

Partial List of Specialties for H-14 Hopper Cars

- Wine hopper door frames and locks
- Standard Railway Equipment uncoupling devices
- Miner A-22-XL draft gears
- National Malleable M-17-A draft gears
- Axee draft key retainers
- American Steel Foundries A-3 trucks
- Standard Car Truck S-2A trucks
- Positive brake regulators
- MS brake regulators
- Creco bottom connection safety supports
- Westinghouse AB-10 air brake
- Ajax hand brake
- Wright pipe clamps and tee anchors
- Cor-Ten steel plate material

Center sill Z-sections have webs punched and then two Z's are welded together by hand. This is followed by punching of top and bottom flanges.



Shop equipment at Princeton includes punches, shears and brakes for fabricating all car components such as the end sills being completed in car shop on this Beatty 36-hole punch.

same reason that the car floor was designed this way—to minimize corrosion by eliminating lapped joints. The bolsters are welded to their bottom cover plates which in turn are welded and riveted to the center sill. These cover plates also serve as the gussets to which the diagonal braces are attached. The Virginian uses two angles for each of its diagonal braces. Each of these pairs of angles, in effect, produces a Z section when the angles are riveted above and below the bolster cover plate and the corner gussets. Gussets connecting the bolster, center sill, and lower floor sheet are made from 15-in., 40-lb channels welded in position.

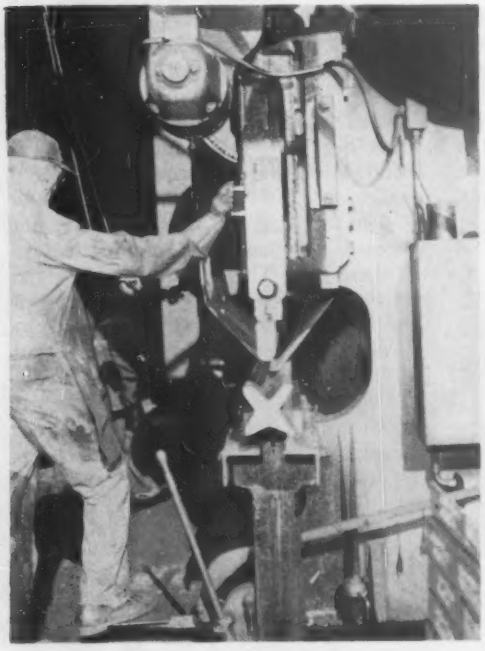
Bolsters are 21-in., 96-lb, wide-flange, I beams bent so that the joints between the lower and upper floors of the car rest on the upper flanges of these beams. These are the only riveted joints on the floor with the exception of the hopper area. Bottom side angles are 3½ x 5 x ½-in. angles running between the bolsters. Top side angles are 4½ x 5 x $\frac{7}{16}$-in. bulb angles running the length of the body. Clips attached to the bottom side angles support the outside hopper sheets which are flat triangular plates. The inside hopper sheets and longitudinal hoods are one-piece fabricated parts supported below the center sill by the combination center sill tie plate and inside hopper sheet support.

The upper floor and end sheet for these cars is made of $\frac{5}{16}$-in. LAHT steel, the lower floor is ⅜-in. LAHT, and the sides are the same material in ¼-in. thickness. The upper floor support is a 3½ x 2½ x ⅜-in. angle, the lower floor support is a ⅜ x 4½-in bar, and crossbearers have a ½-in. web with top and bottom cover plates. The side braces are the Virginian's own design—a cast steel I beam with feet which fit on the car side and on the cross ridge.

The side stakes and posts are riveted to the car side, as are the top bulb and the bottom side angles. The top angle is also welded to the side sheets with a skip-type weld which runs for approximately 15-in. back of each side stake. However, the stakes are not welded in any way to the side sheets or to the car frame members. By not making this framing too stiff, it is intended to resist the effects of car shakers.

Rather than rely solely on rivets in

(*Continued on page 38*)



Through these hoods, Virginian runs brake pipe in straight line from bolster to bolster above center sill. Train line is protected; requires no bending.

One-piece assembly forming the longitudinal hood and inside hopper sheets is formed on Cincinnati Shaper 10-ft press brake. Holes are for door frames; hopper supports.

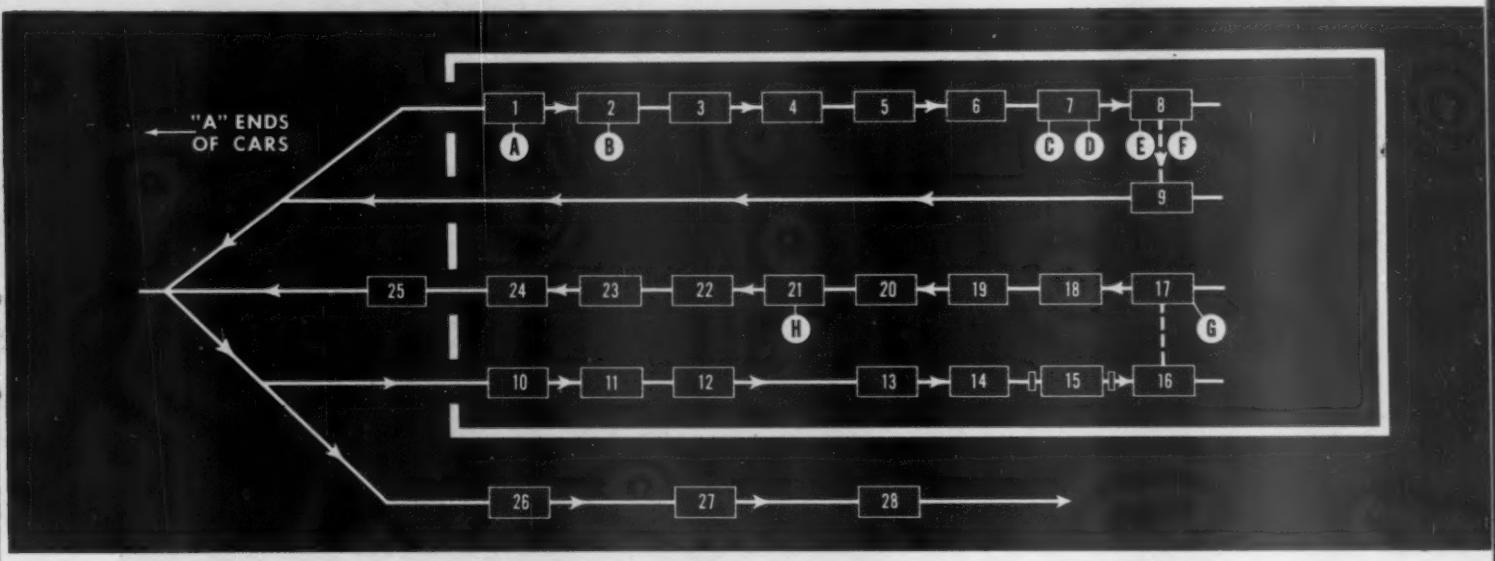
Virginian's Car Shop

The Virginian's Princeton, W. Va., car shop is a four-track building in which the company has built and repaired all types of cars. The current hopper building program utilizes all of the shop track capacity.

Eight cars have been completed per working day on the 28 position production line. The Virginian does its own fabricating work, and has a separate shop at Princeton which handles center sills and other long structural sections.

Sides for the H-14 cars are assembled on jigs and pneumatic squeeze riveting is used for application of the side stakes, and top and bottom angles. All of the rivet heating in the shop is done with resistance-type rivet heaters. Jigs have been set up to permit all welding to be done in the downhand position. At the moment the railroad is doing no automatic welding.

All of the steps in the H-14 production line are described in connection with the schematic diagram of the car shop. Preparation and painting of car is done outside.



SUBASSEMBLY OPERATIONS

A. Punch and weld center sill Z's. Apply strikers, center fillers, slack adjuster, center sill spreaders, tie plates and hopper supports. Fit up and ream. Rivet center sill assembly. Weld on side bearing brace supports, weld center sill to striker castings, and weld on supports for cross ridges and lower floors.

B. Cut and bend bolster I beams. Apply end plates, bottom cover plates and reservoir bracket in jig. Tack weld subassembly.

C. Assemble and weld crossbearer assembly. Assemble cross ridge and crossbearer. Complete welding of entire subassembly.

D. Weld stiffeners on lower slope and hopper floor sheets.

E. Weld angle supports on upper floor and end sheets.

F. Apply side stakes, top bulb angle, and side sill angle to side sheets. Rivet entire subassembly.

G. Build tracks.

H. Assemble door spreaders and locking arrangement on door plates. Fit up, ream, and rivet doors.

ASSEMBLY OPERATIONS

1. Place center sill asembly on shop trucks.

2. Apply bolster subassemblies, body side bearings and braces, and A-end end sill.

3. Apply B-end end sill and all corner posts. Apply end posts, upper floor support legs and gussets, diagonal braces and other car-end components. Fit up B-end.

4. Fit up A-end. Weld bolster to bottom cover plate and weld bolster-and-center-sill gussets.

5. Ream and prepare underframe for riveting.

6. Rivet underframe.

7. Apply and fit up hopper and lower floor subassemblies, cross ridge and crossbearer subassembly, longitudinal hoods and inside hopper sheets, outside hopper sheets, side braces and door frames.

8. Apply and fit up upper floor and end sheet subassemblies, car subassemblies, and end top angles.

9. Set over to second set of shop trucks on adjacent track.

10. Apply placard boards, hand brake, brake step brackets and step, bell crank brackets and bell crank.

11. Align hopper floors and tack weld.

12. Align door frames and tack weld.

13. Tack weld entire car while squeezing it with air-operated hopper clamp and crank-operated side clamps. Complete welding of bolster and crossbearer cover plates. Apply pipe clamp brackets.

14. Weld hoppers, longitudinal hoods, cross ridges, inside hopper and floor sheets. Apply turn-over jig rockers.

15. Rotate car in turn-over jig. Seal weld seams between side sheets and end side sheets. Weld bolsters and hopper bottoms. Weld floor supports at cross ridge, floor support gussets at bolster and weld bulb angle to side sheets at side posts.

16. Remove turn-over jig rockers.

17. Set car body on completed trucks.

18. Ream car body and reapply key bolts.

19. Rivet door frames and center sill area through center of the car.

20. Rivet car ends including end sills, bolster ends, and sill steps.

21. Apply hopper doors and brake rods, levers, draft gears and couplers.

22. Apply AB valve, brake cylinder, reservoir, train line. Pipe brake cylinder.

23. Complete piping of brake equipment. Clamp train line and apply angle cocks.

24. Apply retainer and hoses. Make single car brake test.

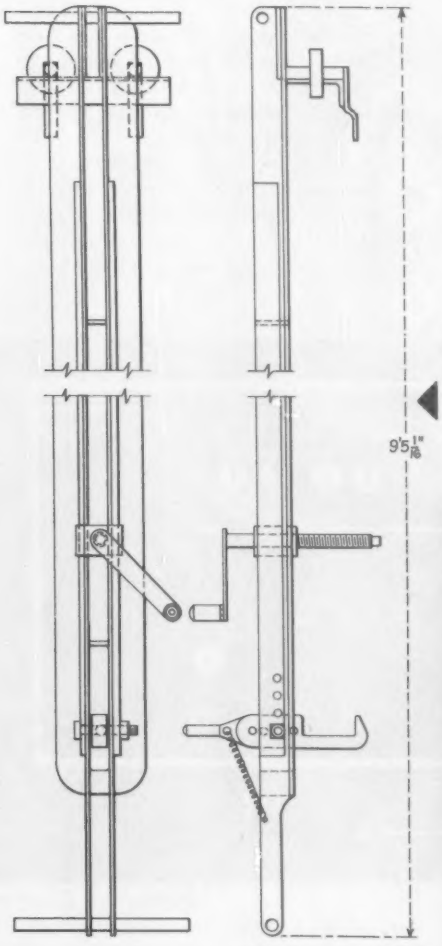
25. Steam and wash down car. Apply car cement to underframe and ends. Spray remainder of body with chromate primer.

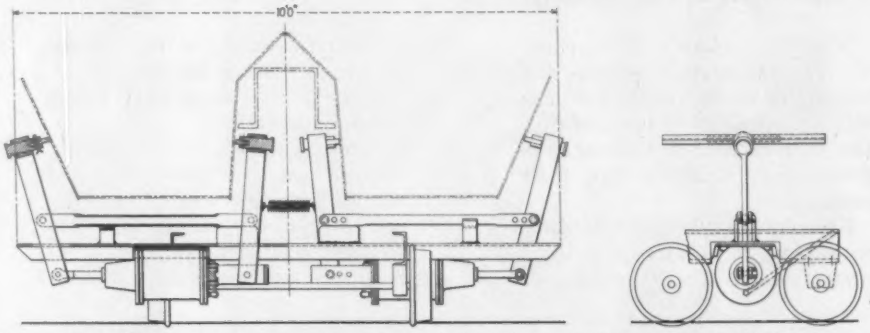
26. Spray first coat of body paint.

27. Spray second coat of body paint.

28. Stencil—majority is applied with spray.

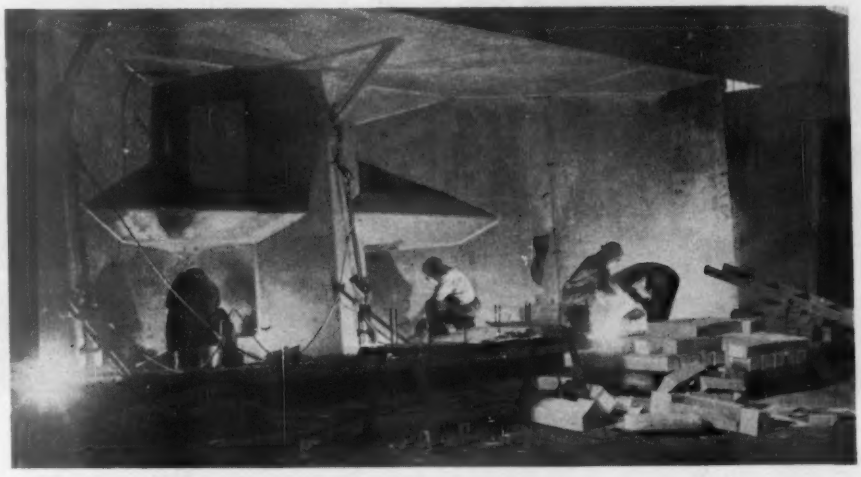
There's Lots of Welding in the H-14 Body





Hopper sheet clamping device is powered with two air brake cylinders and holds inside and outside hopper sheets against hopper floor for tack welding.

Jack to force car sides against floor for welding is tool used along production line to hold two components in position for tack welding. Finish welding is done later.

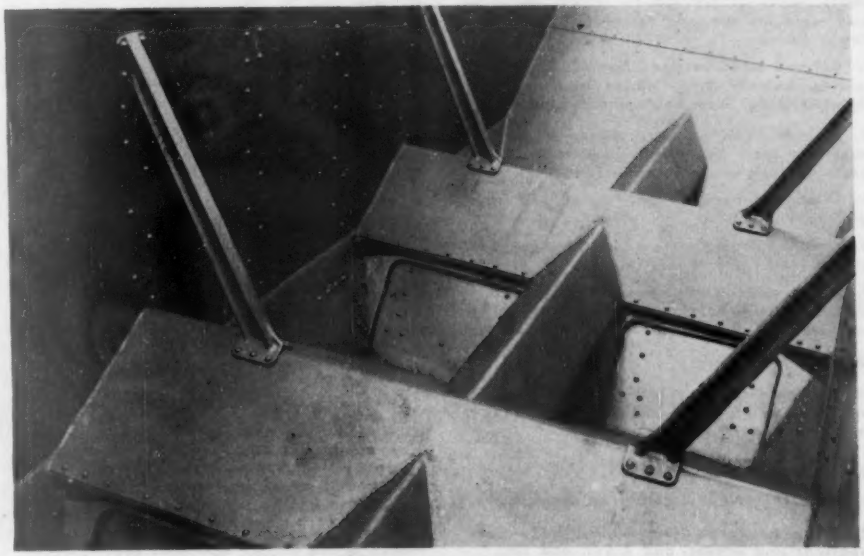


Downhand welding is possible at every step of the assembly. Here body is rotated on rockers attached to the ends of the center sill.

(*Continued from page 36*)

shear to transmit loads from the striking castings into the center sills, the Virginian now welds the strikers, as well as riveting them. This is possible because the striking castings are designed with lugs which line up with the ends of the webs of the center sill Z-sections. A gap is left which is filled by welding and this then makes the striker and center sill continuous. The conventional riveted connections are also used in applying these castings.

The completed cars each have a capacity of 2,573 cu ft level full. The body weighs 37,200 lb and the total light weight of the completed car is 54,200 lb. The Virginian is turning out what its experience, tests and calculations indicate should be an economical, rugged hopper car. Designs and materials were chosen to resist corrosion and impact, while keeping construction and maintenance costs at a minimum.

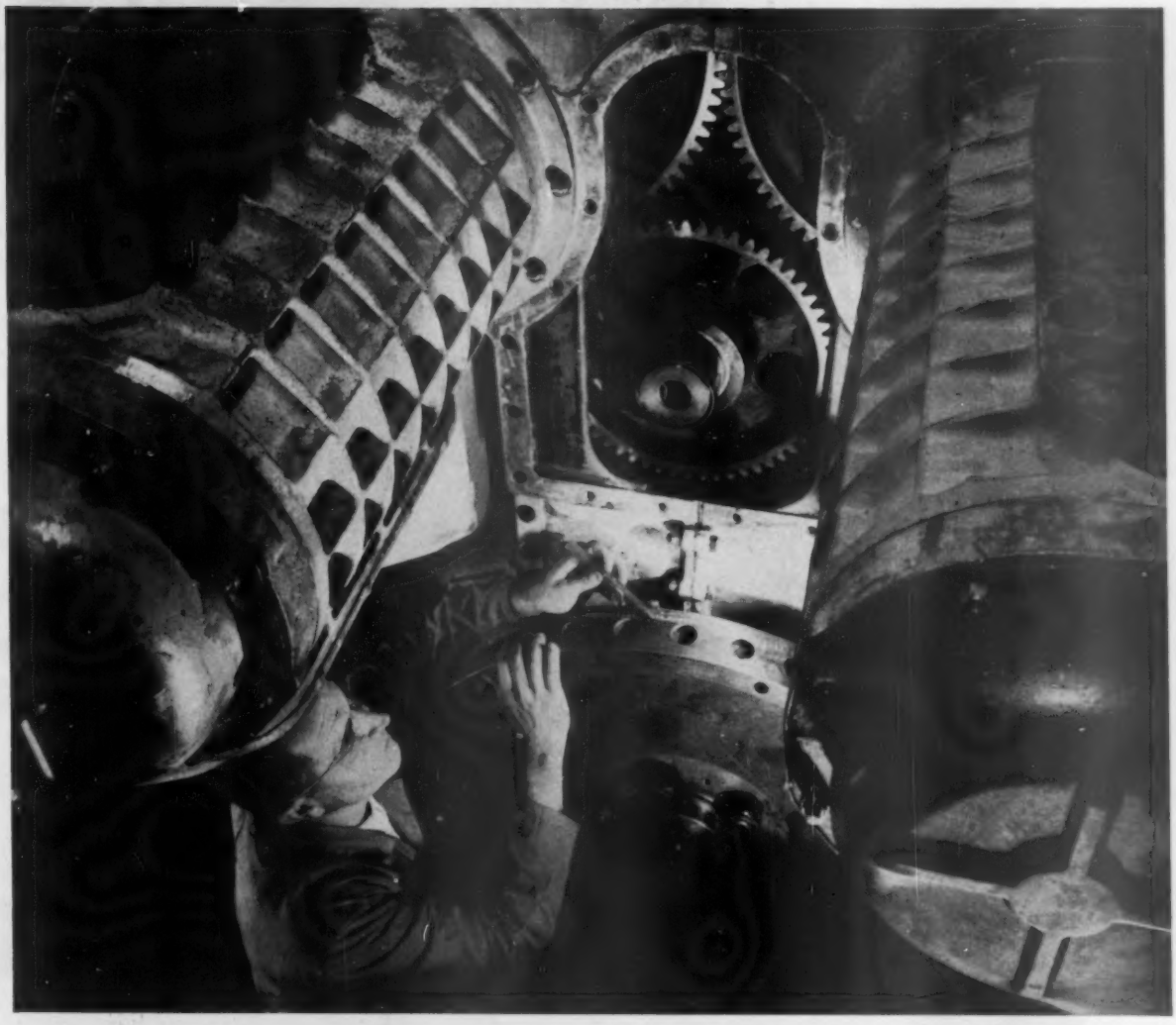


Welded joints and as few holes as possible characterize the bodies of these 70-ton hoppers. All of the plates contacted by the lading (and visible here) are Cor-Ten steel.

ENGINEER'S FIELD REPORT

PRODUCT RPM DELO OIL RR

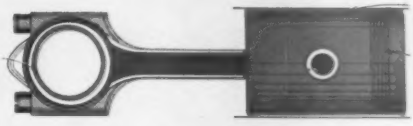
FIRM NORTHERN PACIFIC RAILWAY
South Tacoma, Wash.



RR diesel gears show only ½° wear in 2½ million miles

Timing gears on this Northern Pacific GMC-diesel locomotive engine, lubricated with RPM DELO Oil RR, recently completed 2½ million miles of severe freight service without repairs or adjustment. NP's South Tacoma Shop Foreman, A. R. Genin (above), indicates degree marks on engine flywheel, used to gauge gear wear. Tolerance between gear teeth shows variance of just ½° from original setting. Mr. Genin says, "We consider this low rate of wear remarkable for heavy-duty freight operation. It is typical of our experience during the 12 years we have used RPM DELO Oil in all our locomotive diesels." Engines are 1350 h.p. 16-567 series.

Why RPM DELO Oil RR reduces wear, corrosion



• Oil stays on engine parts—hot or cold, running or idle • Anti-oxidant resists lacquer formation • Detergent keeps parts clean • Special compounds prevent corrosion of bearing metals • Inhibitor resists foaming.

about RPM DELO Oils or other petroleum products of any kind, or the name and address of your nearest distributor, write or call any of the companies listed below.

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THE CALIFORNIA OIL COMPANY, Perth Amboy, New Jersey

STANDARD OIL COMPANY OF TEXAS, El Paso

THE CALIFORNIA COMPANY, Denver 1, Colorado

Cast Steel
INCORPORATED DROP END UNITS
Speed

Inside view—showing top corner interlock and bottom corner hinge trunnion.

Service.. Sustain Structure

For outstanding economies . . . increased safety factors . . . improved strength and durability for the life of the car—Wine Drop End Units (Locks and Balancers) form *the perfect* combination!

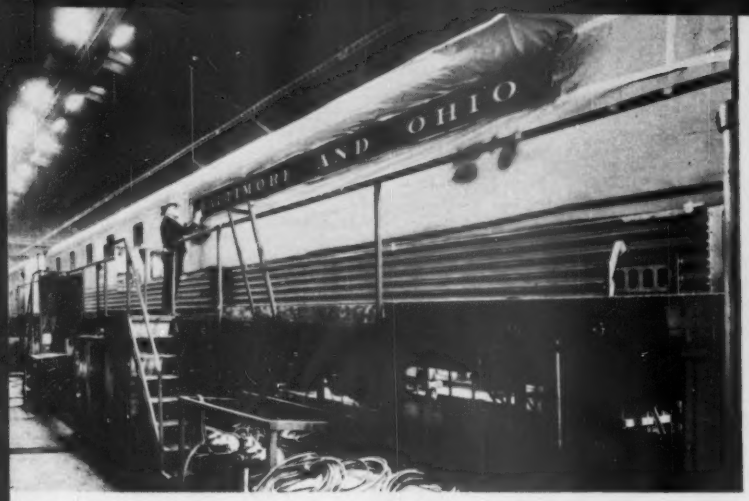
WINE
Drop End Locks

. . Rigidly interlock gondola sides and ends together—securing the ends in an upright position. Top corners of the car cannot spread regardless of load. Wine Drop End Locks are shipped as an assembled unit, ready for quick application. Made of electric cast steel, they insure maximum service and durability throughout the life of the car.

WINE
End Balancers

. . . Eliminate the necessity of using *four or five men* to close a drop end for car loading! Multiple spring steel torsion bars, incorporated between the center casting and the two outer hinge trunnion castings, permit *one man* to readily close the heaviest drop ends without assistance. Available for easy application on most drop end gondolas.

THE WINE RAILWAY
APPLIANCE COMPANY
TOLEDO 9, OHIO



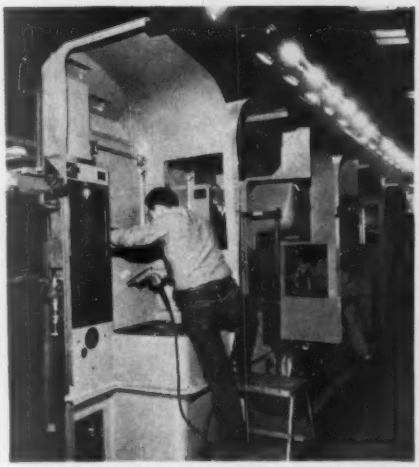
Slumbercoach weight of 141,000 lb can be compared with the 121,500 lb weight of conventional 60-passenger coach. B&O owns two.

Stainless steel structure for these new cars is of the regular Budd design despite their radical interior arrangement.

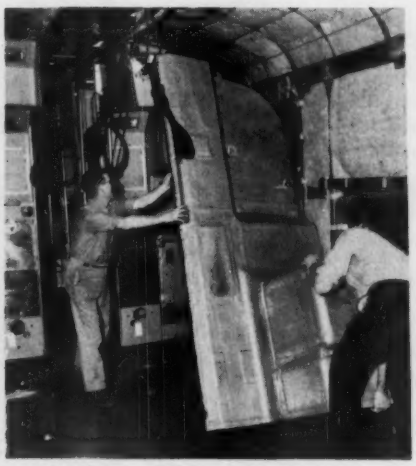
Slumbercoach: 40-Passenger Room Sleeper

In the fall of 1956, the Burlington received the first four Slumbercoaches. Recently the B&O has been the second US road to put these cars in service. Budd delivered them from its current production run. The cars have capacity for 40 passengers in both day and night service. Key to high sleeper capacity is the split berth arrangement making it unnecessary to have a 6-ft vertical wall for the bed. This makes possible a very compact interlocking of adjacent rooms. Each room has complete toilet facilities, but all accommodations are less elaborate than those of conventional roomette cars.

High passenger capacity of these cars has made it possible for both the B&O and Burlington to offer this sleeper service at coach fares with a modest charge for the room accommodation.



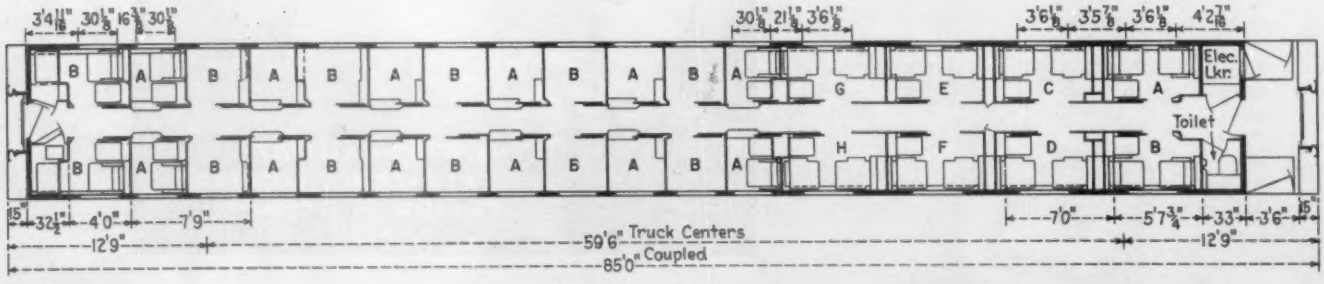
Fiberglass-reinforced plastic moulded room shells are in two halves. Each portion is completely trimmed before installation.



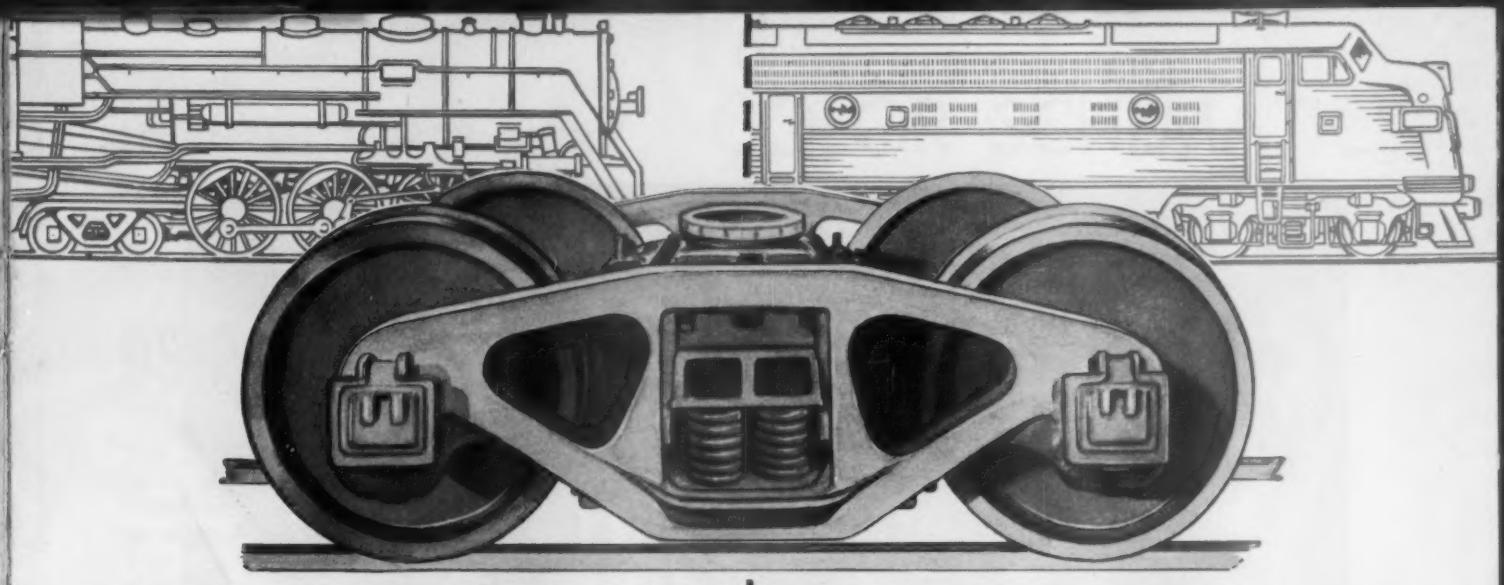
Half-room assemblies fit into the car shell. Single rooms are of two types—an upper two steps above aisle; lower at aisle level.

Partial List of Supplies

Bethlehem Steel Co.	Wheels and axles
Crucible Steel Co.	Truck springs
Fabreeka Products Co.	Pads
General Steel Castings Corp.	Truck castings
Houdaille Industries	Shock absorbers
SKF Industries	Bearings
National Malleable & Steel Castings Co.	Yokes, couplers
Waugh Equipment Co.	Draft gear
Youngstown Steel Car Corp.	Underframes
National Brake Co.	Hand brakes
Westinghouse Air Brake Co.	Air brakes
Adams & Westlake Co.	Curtain fixtures, window sash
Gustin-Bacon Manufacturing Co.	Insulation
Heywood-Wakefield Corp.	Bedroom seating
Morton Manufacturing Co.	Inner diaphragms
U. S. Plywood Corp.	Micarta-covered panels
Gould National Storage Battery Co.	Batteries
Luminator, Inc.	Light fixtures
Safety Industries, Inc.	Generators and controls
Dana Corp.	Spicer drives
Westinghouse Electric Corp.	Fans, Relays, Circuit breakers
Anemostat Corp. of America	Anemostats
Barber Colman Co.	Grilles
Trane Co.	Air conditioning
Barco Manufacturing Co.	Steam conduit
Crane Co.	Hoppers
Vapor Heating Corp.	Heating equipment



Lower level single rooms are designated "B", upper level singles are "A", and right end of car has eight double rooms with upper and lower berths.



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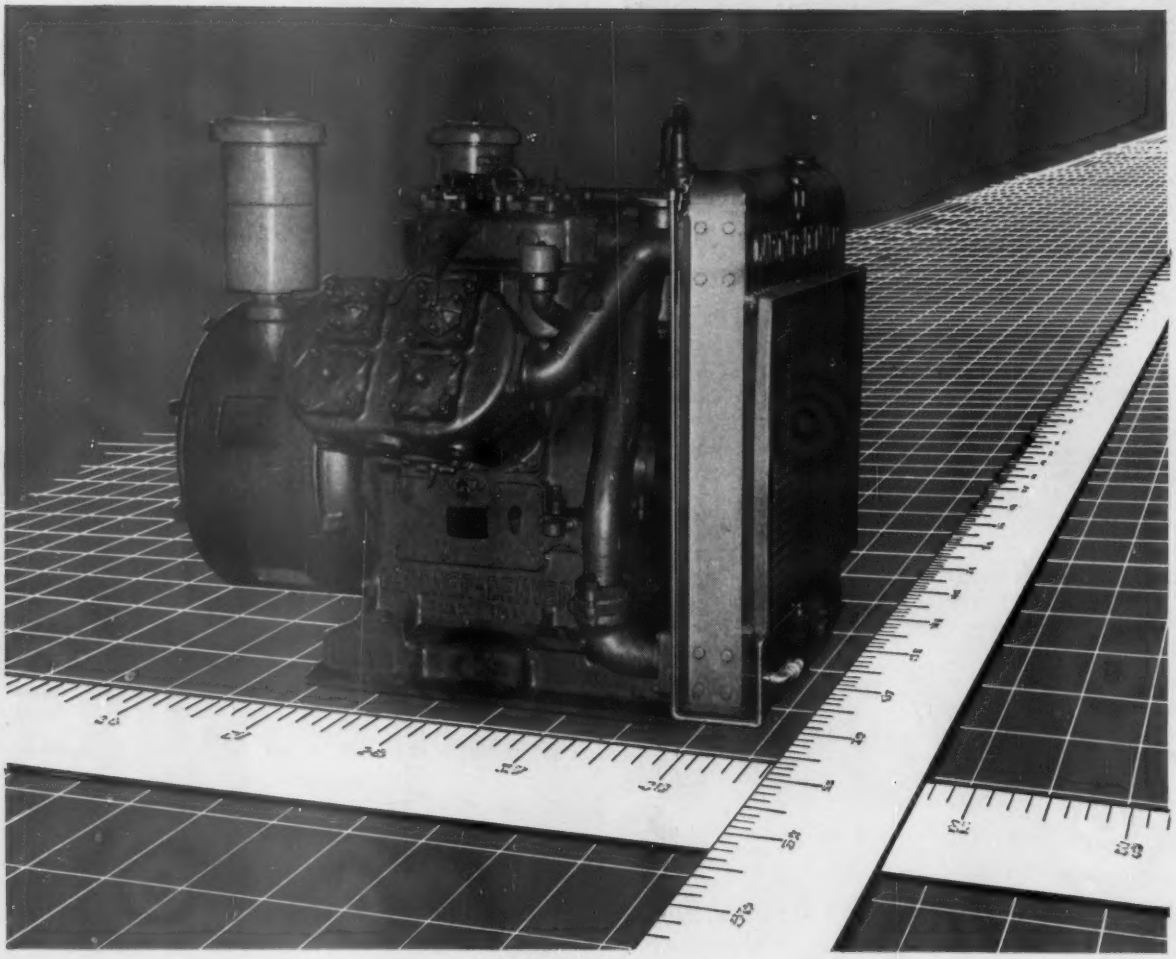

Made to the measure of smaller space— this high-capacity Gardner-Denver compressor

Lots of power and high capacity in a compact, space-saving package. That's the Gardner-Denver WBN compressor—an easy, economical way to side-step the soaring cost of factory floor space.

Occupying only 34 sq. ft. of space, this 200 hp unit is rated at 1150 cfm piston displacement. In many instances, this volume permits retirement of two smaller units, with corresponding savings in space.

The Gardner-Denver WBN needs no special base. Just bolt it down, hook it up and put it to work. It is available with a self-contained radiator-intercooler that conserves cooling water, or with a tube-type intercooler.

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24-RL Brake Equipment *Installment 1H*

DS-24-M Pressure Maintaining Brake Valve

This is the eighth installment on the 24-RL Equipment in the Color Schematics series. For the 1G installment see Page 37 of the November, 1957, issue.

Maintaining Cut-Off Valve Connections in Running Position (Sketch 21)

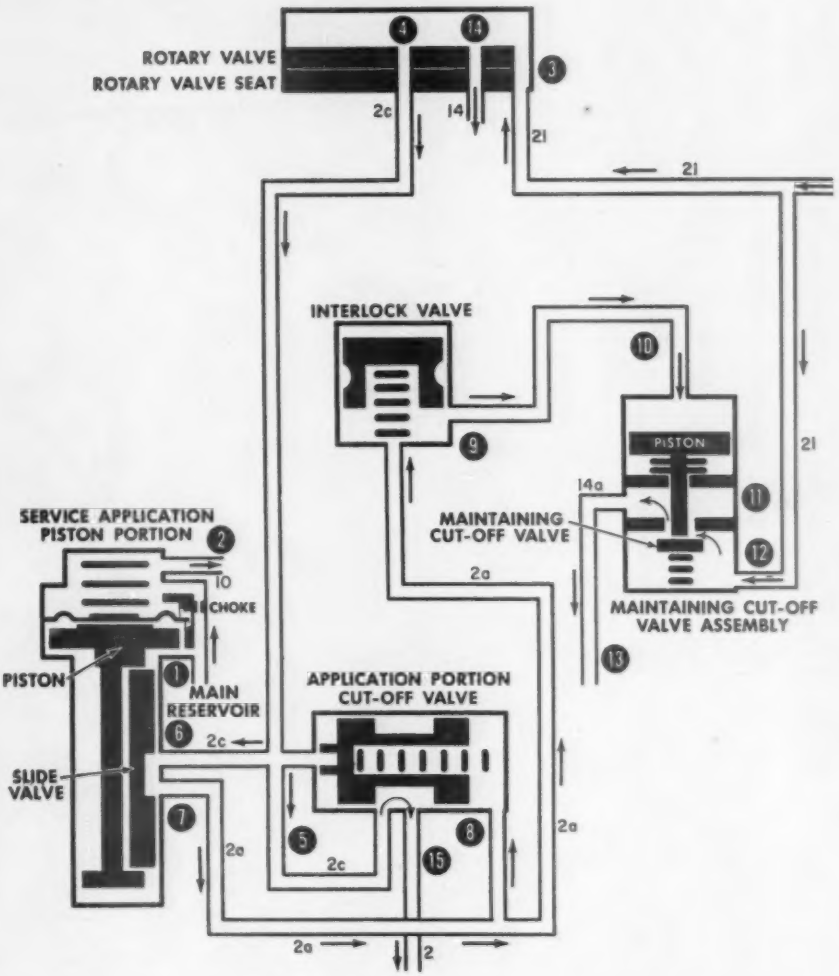
This schematic has been made up to show the relation of the Pressure Maintaining Feature to the rotary valve, application cut-off valve, and the service application piston and slide valve. The equalizing piston portion is not shown.

Air from feed valve passage *21* flows to the space above the rotary valve. From there the air flows through passage *2c* to the left face of the cut-off valve piston and through the service application slide valve into passage *2a* leading to the spring end of this piston. With air balanced on both faces of the piston, the piston spring moves the piston to permit passage of air from passage *2c* to *2*, and to the brake pipe. Air flow continues through passage *2a* to the chamber below the interlock piston valve. With the valve in *IN* position, air is permitted to flow to the chamber above the maintaining cut-off valve piston.

The piston is moved downward, and its stem contacts the cut-off valve which is unseated in this movement. Feed valve air from passage *21* is then free to flow past the open cut-off valve to passage *14a* which leads to the maintaining valve of the equalizing piston portion (not shown).

At the service application piston and slide valve assembly, main reservoir air goes through a passage to the space below the application piston, and through a choke to the spring chamber above the piston. With the pressures equalized, the spring moves the piston to its down position. Main reservoir pressure also flows from above the piston to the safety control system (not shown) through passage *10*.

To color sketch *21*, begin with a carmine pencil and fill in the main res-



Sketch 21
Maintaining Cut-Off Valve Connections in Running Position

1. Main Reservoir air flows to spaces above and below application piston.
2. Flow continues from the space above the piston to passage *10*.
3. Feed valve air goes from passage *21* to the space above the rotary valve.
4. Feed valve air continues through the rotary valve and seat to passage *2c* . . .
5. . . . And continues to the left of the cut-off piston and to the opening in the center of the piston.
6. Air also passes through passage *2c* to the cavity in the slide valve . . .
7. . . . And from the slide valve cavity to passage *2a*.
8. The flow continues from *2a* to the right of the cut-off piston . . .
9. . . . And from *2a* to the space below the interlock piston valve.
10. From the interlock piston chamber, it continues to the space above the maintaining cut-off piston.
11. The piston moves down, unseating the maintaining cut-off valve.
12. Feed valve air from passage *21* flows past the open valve to passage *14a* . . .
13. And continues through passage *14a* to the equalizing piston portion (not shown).
14. Feed valve air goes through the rotary valve and seat to passage *14* . . .
15. . . . And from the center of the cut-off piston to passage *2* and to the brake pipe.

ervoir passage, the spaces above and below the application piston, and passage *10*. Dampen with a small brush and let dry before proceeding. With an orange pencil, fill in the space above the rotary valve, passage *21*, the space above and below maintaining cut-off valve, and passage *14a*. Fill in passage *14* through the rotary valve and seat, and through passage *2c* to the point where the rotary valve contacts its seat. Dampen and let dry.

With a yellow pencil, start in passage *2c* at the point where the orange color left off (at the rotary valve seat). Complete filling in this passage, and color the space at left end of the cut-off piston continuing through the opening in the piston to and including passage *2*. Continue with the yellow color in passage *2c* into the slide valve cavity and into passage *2a* which must also be colored to and including the following: spring end of cut-off piston, spring end of interlock valve, and the chamber above the maintaining cut-off valve piston. Dampen and let dry.

Automatic Cut-Off of Pressure Maintaining (Sketch 22)

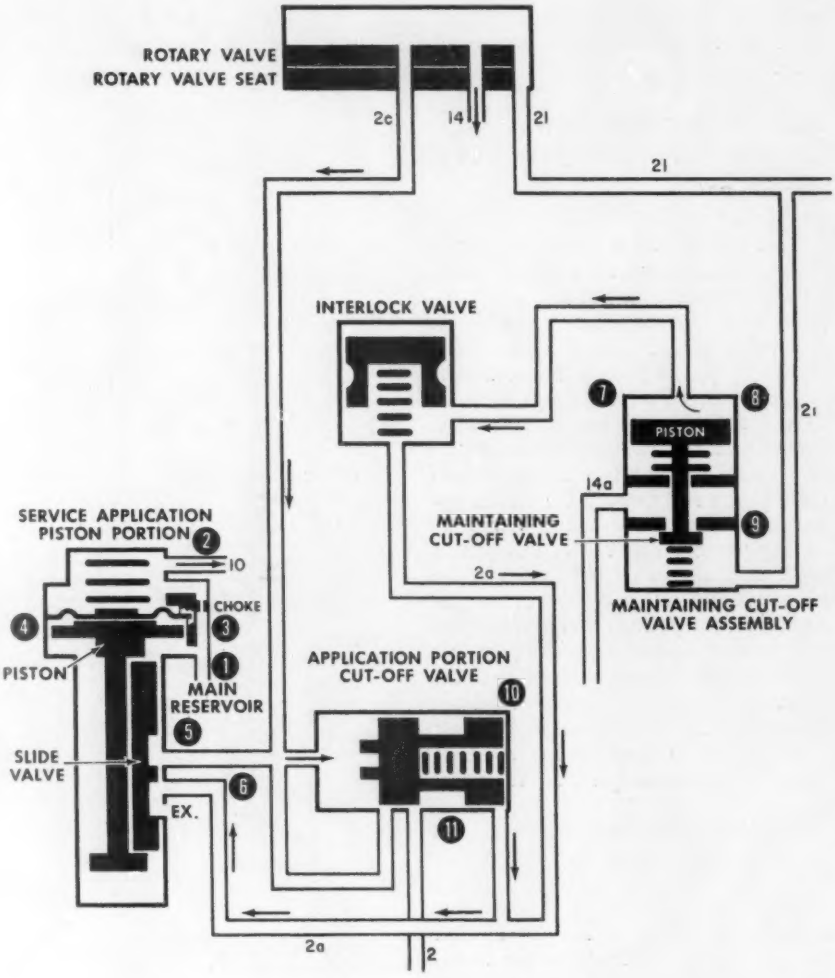
When a reduction in pressure takes place in the No. *10* line (safety control system), then a reduction occurs in the chamber above the service application piston at a rate greater than can be made up through the choke. The piston and slide valve move to the upward position. The slide valve in this position disconnects the feed valve supply to passage *2a* and connects this passage to atmosphere through the *EX*. With passage *2a* connected to atmosphere, chamber pressure at the spring end of the cut-off piston is reduced proportionately, with the result that supply pressure at the opposing end of the piston moves the piston to the right, cutting off supply to brake pipe passage *2*.

The air above the maintaining cut-off piston, now connected to passage *2a*, also passes to the atmosphere, with the result that its spring moves that piston upward. The piston stem moves away from contact with the maintaining cut-of valve which permits its spring to close the valve. This cuts off supply from feed valve passage *21* to passage *14a*, and stops further pressure maintaining.

To color Sketch *22*, proceed as follows: With a carmine pencil, fill in main reservoir passage to the choke and the space below the service application piston. From the choke, color in carmine dashes the space above the piston and passage *10*. Dampen and let dry.

With an orange pencil, fill in the space above the rotary valve, passage *21*, and the space beneath the maintaining cut-off valve. Color in orange dashes the space above the maintaining cut-off valve and passage *14a*. Fill in passage *2c* through the rotary valve and seat, the space at the left end of the cut-off piston and the cavity in the slide valve. Carry the color in this passage to the point where it is cut-off by the piston. Fill in passage *14* through the rotary valve and seat. Dampen and let dry.

With a yellow pencil, fill in passage *2*. Fill in with yellow dashes the space above the maintaining cut-off piston, the passage, the space beneath the interlock piston, passage *2a* through the application slide valve to *EX*, and the chamber at the spring end of cut-off piston. Dampen and let dry.



Sketch 22

Automatic Cut-Off of Pressure Maintaining

1. Main reservoir air flows to space above and below the application piston.
2. Air pressure in the safety control system has been reduced.
3. Main reservoir air cannot flow through choke at a rate to compensate for the reduction above the application portion piston.
4. Greater pressure beneath forces piston to its upward position.
5. The piston carries the slide valve with it.
6. The slide valve cavity connects passage *2a* to exhaust *EX*.
7. Air above the maintaining cut-off piston escapes past the interlock valve and through passage *2a* and the slide valve to exhaust *EX*.
8. Piston is forced upward by its spring permitting cut-off valve spring to seat the cut-off valve.
9. Feed valve air cut-off is closed by the cut-off valve, which stops pressure maintaining.
10. Loss of pressure at the right of the cut-off valve piston causes it to be forced to the right by the supply pressure on the left.
11. Movement of this piston cuts off supply from passage *2c* to passage *2* (brake pipe).

One of the most extensive railroad machine shops is that of the Norfolk and Western at Roanoke. The above photos were taken in the Wheel Shop.

Norfolk and Western's Roanoke shops exemplify the completeness of the Niles machine tool line

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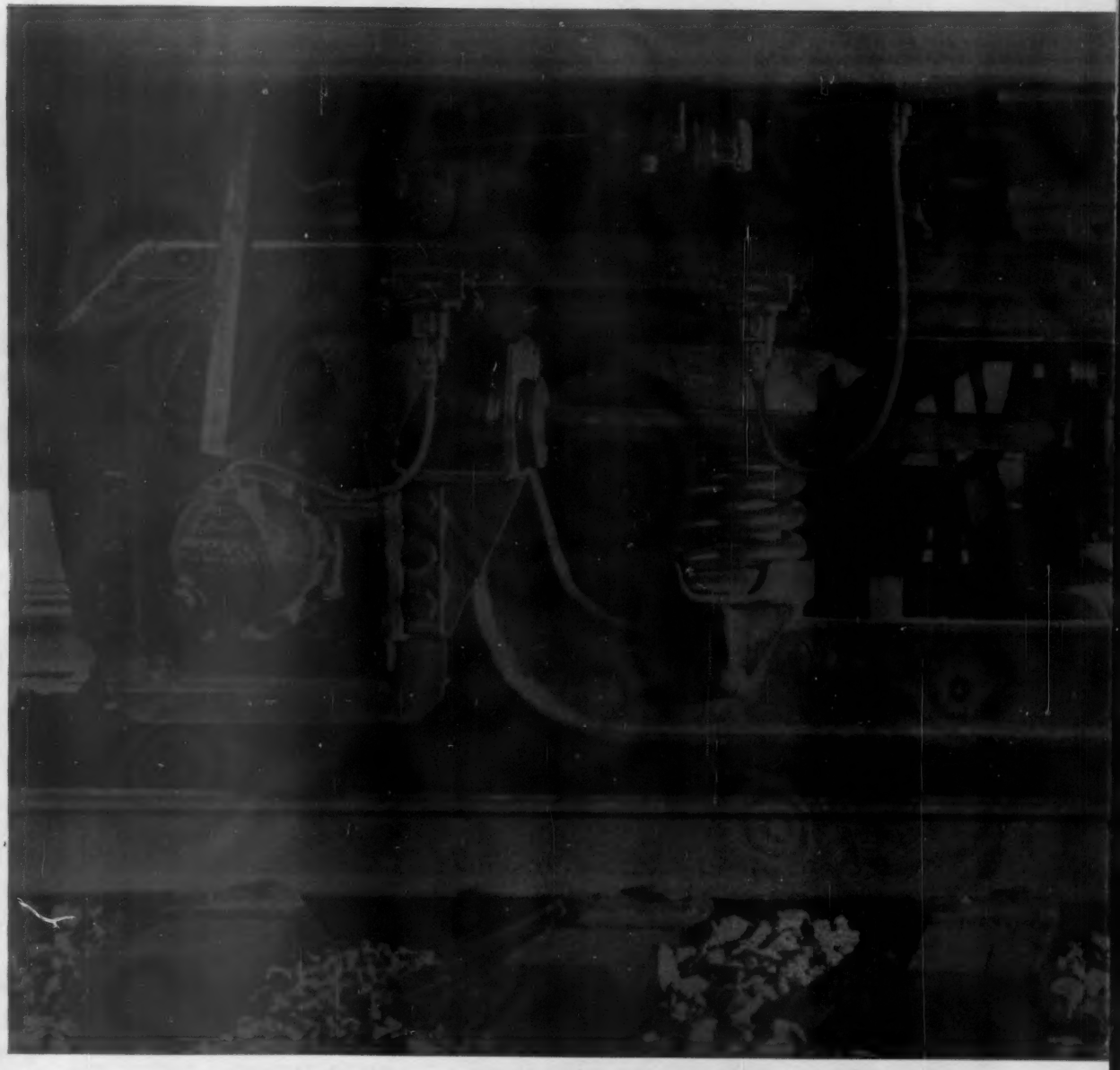

New Gulfcrown R. R. is a lithium base grease especially developed to provide better lubrication for railroad car roller bearing journals. It has been tested and approved against new A.A.R. Specification No. M-917-56. Gulfcrown R.R. is available now, in 35 lb. pails, 100 lb. drums and 400 lb. drums.

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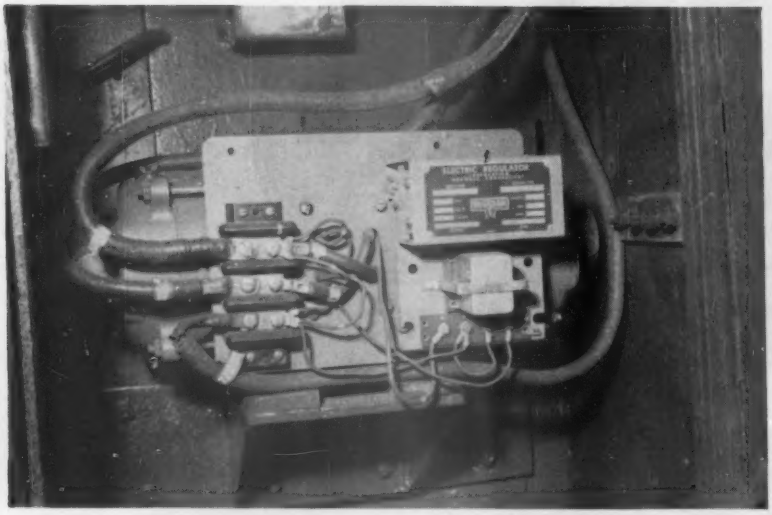
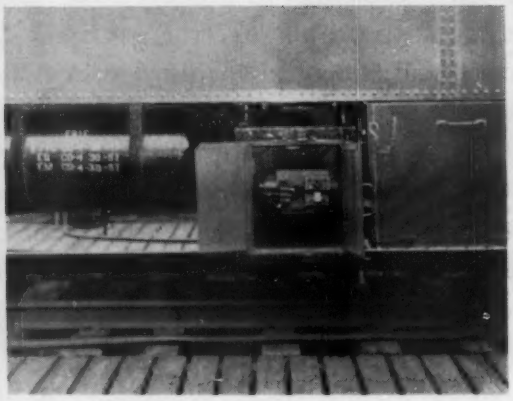




At left: The set which is suspended under the car body is easily available for inspection.

Above: The lamp regulator is mounted in a cabinet under the car frame alongside the battery box.

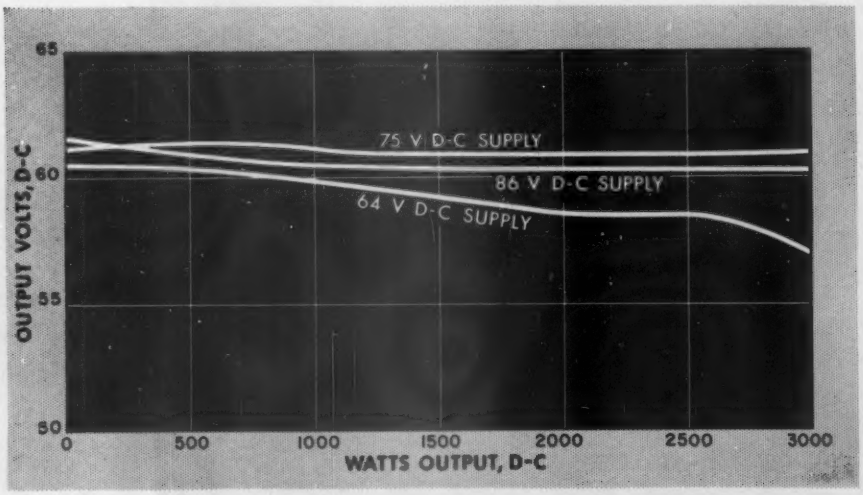
M-G Lamp Regulator Is Highly Efficient

DEVELOPED ON THE ERIE, a motor-generator type of lamp regulator for railway passenger cars has now been made available by the General Electric Company. It is suitable for use with either lead-acid or nickel-iron storage batteries. Its voltage output when used on unregulated voltage supply is indicated by the curves. The machine is rated 2,200-watts at 60 volts output. The test curves are carried beyond rated load to indicate performance under all conditions.

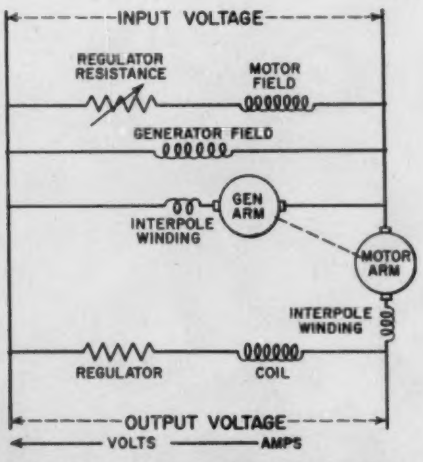
The regulator is a motor-generator. The motor is connected in series with the load and the generator is in parallel with the load. The two units are connected mechanically on the same shaft.

The d-c motor operates on the differences between the input and the output voltages. The generator, which is driven by the motor, feeds power back into the line. This results in high-efficiency performance since no power is dissipated in an external resistance. A finger-type regulator controls the motor shunt field strength to produce constant output voltage.

The unit weighs 80 lb and has an overall length 19 in. Mounted as shown in the illustration, the overall height is 8½ in. and the depth, front to back is 10½ in.



The curves show the output voltage throughout the load range for three values of voltage input.



Wiring diagram for the regulator. The dotted line indicates the shaft connection between the motor and generator.

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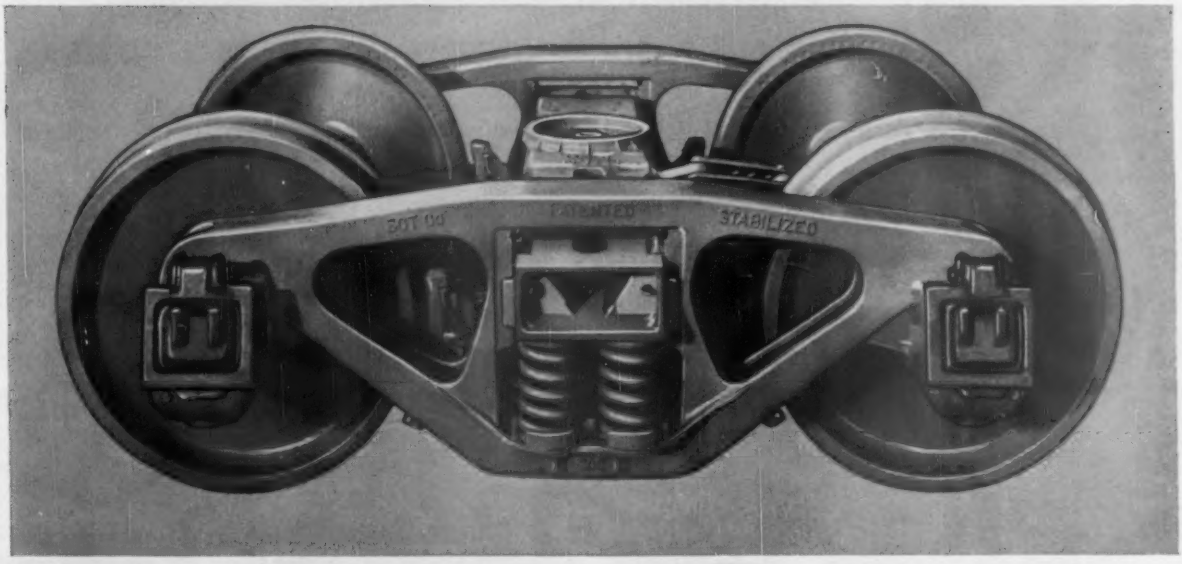

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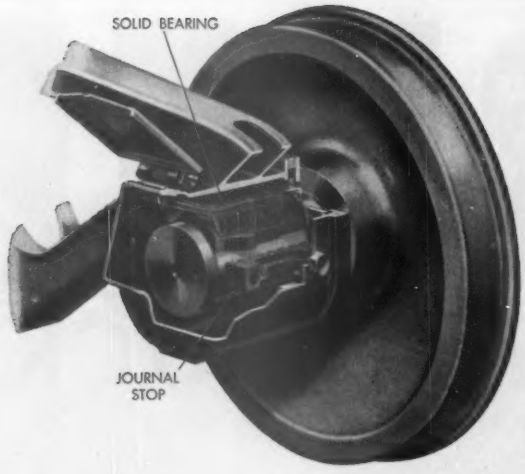

Railroads using R-S Journal Stops today save about $35.00 per car year in reduced operating costs alone —fewer hot boxes, longer bearing and axle life, and reduced service attention. They save the complete cost of the R-S Journal Stops, including installation, in less than 3 years — bring the total cost of solid bearing operation down to less than 13¢ per car day.

That's just one of the facts about low-cost solid bearings with R-S Journal Stops — proved now on over 5000 cars in service. Potential savings are even greater. That's because R-S Journal Stops stabilize the bearing assembly, give the low-cost solid bearing a chance to work at optimum efficiency. That cuts truck maintenance costs all along the line. It

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assures the practicability of 3-year repack intervals and reduces the requirements for an effective rear seal.

And with R-S Journal Stops you still have all the advantages which low-cost solid bearings bring to railroad rolling stock. You can take the maximum load, make the fastest schedule. You save excess dead weight and get lowest possible running resistance in pounds per ton. Best of all, you'll be sure of the kind of bearing performance you want at a price you can afford to pay.

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EXAMPLES OF ANNUAL SAVINGS IN BEARING MAINTENANCE WITH R-S JOURNAL STOPS

Description	Without Stops	With Stops	Savings
Repairing Hot Box Set-Outs ...	$9.05	$0.91	$8.14
Damage to Equipment	2.01	.20	1.81
Fires Due to Hot Boxes	.29	.03	.26
Cut Journals	1.35	.34	1.01
Defective Brgs., Routine Insp. .	2.69*	1.35	1.34
Routine Yard Inspection	40.82	24.11	16.71
Material—Not Included Above			
Defective Bearing Replacements	4.36*	2.18	2.18
New Axles	3.35	.84	2.51
Spring Packing Retainers	.46	.00	.46
		TOTAL SAVINGS	$34.42

**Technical Advisory Committee figures. Other figures in this column based on 1954 costs as determined by AAR.*

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Solid Bearings

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Subsidiary of **NATIONAL LEAD COMPANY**

HOW MUCH DO YOU KNOW ABOUT BRUSHES?

Some After Thoughts

THERE'S A SONG that has a line in it—"Don't monkey with Mr. In-Between." The brushes on main generators and traction motors are the Mr. In-Betweens of the diesel-electric unit. They conduct all of the power which these units develop. When operating conditions are changed, it's a pretty safe bet that brush performance will change. When people know they may be exposed to some contagious disease, they usually go to a medical doctor for council and help. It would seem logical that some responsible railroad person should seek the guidance or help of a brush representative when that railroad contemplates changes of a nature that may affect brush performance. There are innumerable so-called experts who make indiscriminate brush grade recommendations without sufficient knowledge of brush grade variables and operating variables. These are the *experts* who cost railroads dearly, in trouble and maintenance. However, today most railroad users of brushes are making effective use of the service available to them from reliable brush producers to reduce the hidden costs of improper brush grade application.

This seems to be a good place to make a point aimed at saving some maintenance money. On a large railroad system equipment is usually operated over several divisions, each being concerned principally with performance on their own division. It may be true that a file of equipment maintenance is available for each unit, motor, or generator, as the case may be.

However, if these records are ancient history by the time they are accumulated, one means of cutting operating costs is lost. A unit may have been in trouble several times for the same reason, but with an up-to-date all-points record, there is no tie-in with that unit's system-wide performance.

This writer knows of one case where a single unit destroyed over eight armatures in the same motor position over the system and, because of the age of the motor, the real trouble was not uncovered until the unit failed for the third time in one particular division. Armatures do fail and without adequate correlation of the complete performance picture for a given unit, there was no other way for any given division to realize the unit in question actually had something seriously wrong in the electrical circuits. The relation of this point to brushes lies in the fact that such a record would also give an excellent performance picture for brushes on a given railroad. If no armatures are being turned down or reconditioned, the brushes must be doing their commutation job. If armatures are requiring abnormal attention, the record would serve as factual evidence to that effect thus helping to eliminate the need for decisions to be made on an opinion basis. It is not enough to know that so many motors are being sent in for overhaul per month. Lack of performance records makes a happy hunting ground for the vendors of products which are sold by glib-talking salesmen rather than by the hard dollar record or product performance.

In closing this series of questions and answers, the writer would like to add one more statement. I have been frequently asked, "What is the greatest single source of commutation trouble on traction motors and generators?" The answer is one word: *DIRT*. Keep them clean and they will repay you in longer, trouble-free service.

By K. R. MATZ
National Carbon Company

This is the concluding article in the series of questions and answers on brushes.

From the Diesel Maintainer's Note Book

The Engine Ran Without Fuel

By Gordon Taylor

WHEN AN EMD SWITCHER was turned in after a three-day tour of duty, the engineman reported everything to be in good order, except the radiator shutters which would not open. Fortunately, the weather had been so cold that there had been no trouble from overheating the engine.

The first thing that the maintainer did was to check the temperature control switch. He found no power or voltage at that location. The temperature control or shutter control is fed from the fuel pump circuit, so the maintainer went up to the cab. There he found the control switch closed, but the fuel gage showed zero. He then went out to look over the fuel pump and found it dead, so he moved back to the cab and found the fuel toggle switch in the *off* position. The switch was snapped to the *on* position and everything worked okay. That is, the fuel pump would operate, and the temperature control switch was energized.

He was glad that the shutter control question was settled, but he was upset by the new question. How and why was the engine running for three days with the fuel pump dead and not supplying fuel to the engine? The shutter control had been giving trouble for three days, so it could be assumed that the fuel pump had been shut down the same length of time.

The maintainer now had a mystery on his hands. He shut down the engine, and then started it up in the regular manner by turning the fuel pump switch on. After the engine had run for several minutes, he shut the fuel switch off and the engine continued to run, just as it had done in service.

The next morning several maintainers decided to get the answer to the riddle, and after starting the engine with the fuel pump running, they turned they turned the fuel pump switch off. The

(*Continued on page 64*)

This series of articles is based on actual experiences of men who operate and maintain diesel-electric locomotives.

Over $100,000 a year can be cut in passenger terminal operating costs

by Standard's Wheel Truing Machine

$129,140 a year *saved*—over $350 a day. Look at this analysis, made by a leading railroad during recent installation, of the savings to be realized through the cost-reducing performance of Standard's Wheel Truing Machine:

WHEEL TRUING MACHINE SAVINGS ANALYSIS

DIRECT SAVINGS—ANNUAL

(Based on actual passenger car wheels removed during last 6 months of 1957 by reporting railroad)

Total Wheels Changed	2,592
Changed for Other Than Turning	244
Net Wheels Changed for Turning	2,348

Average Labor and Material saved per pair turned—$55.00

TOTAL ANNUAL LABOR AND MATERIAL SAVINGS . . $129,140.00

MAJOR INVENTORY REDUCTION

(Actual reduction made at time of machine installation)

Wheel Assembly Type	Inventory Reduction	Value Each	Total Reduction
Roller Bearing with Clasp Brake	59	$ 856	$50,504
Roller Bearing with Budd Disc	35	1428	49,980
Roller Bearing with Spicer Drive	25	1783	44,575

TOTAL MAJOR INVENTORY REDUCTION $145,059*

*Inventory Reduction alone, is great enough to offset the cost of the machine. Therefore, all savings in Labor and Material are *pure* savings . . . savings in the cost of doing passenger business. A number of railroads are now enjoying savings like these. Our representatives can supply the facts behind studies of this nature. If you desire immediate information, write to: WHEEL TRUING, Standard Railway Equipment Manufacturing Company, 310 So. Michigan Ave., Chicago 4, Illinois.

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8 Roll Them Out Like New

Disassembling Equipment at the Backshop

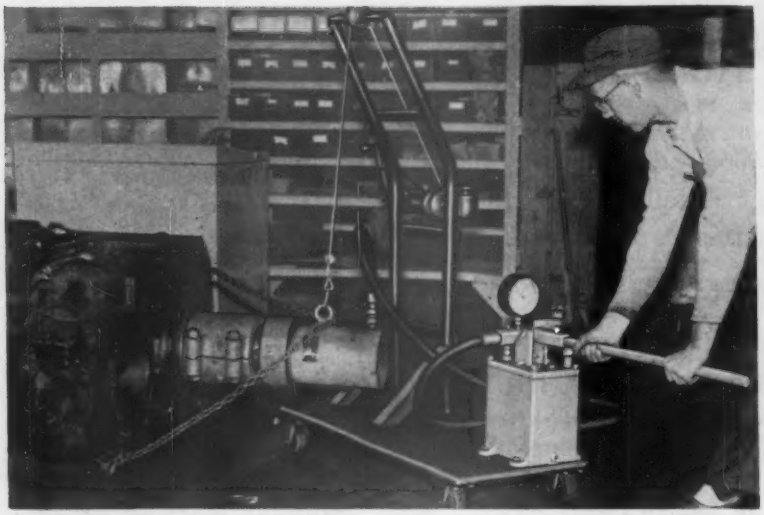

Fig. 1—Hydraulic pinion puller in use.

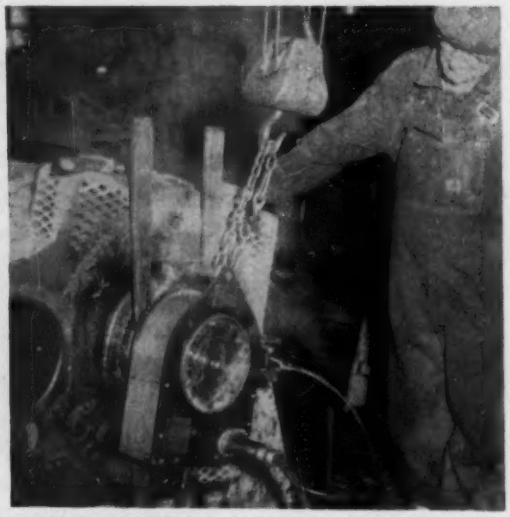

Fig. 2—Induction heater and wedges used for pulling pinion.

THE NEXT STEP in backshop maintenance is to disassemble the machine and inspect the parts to determine their suitability for reuse. Like the hospital surgeon, the backshop expert must open up his patient carefully, so no harm is done in the operation. This requires the proper tools. Backshop "knowhow" is also essential so first things will be done first. You must know your machine as thoroughly as the surgeon knows the anatomy of the human body. Like him, you get this knowledge by study and practice. Refer to the manufacturer's instruction books, and study the cross-section drawings showing how the parts fit together.

Pulling the Pinion

Pulling the accurately fitted pinion from the tapered shaft of a traction motor is a job for powerful tools. Two widely used types are the hydraulic puller, and the induction heater puller. Each has its advantages and disadvantages. Local shop conditions and practice usually justify the particular choice. Either must be specifically adapted to fit the pinion correctly. Do not makeshift by attempting to use the same puller adaptor or heater coil on both freight and passenger pinions.

Some shops prefer the hydraulic type, such as the 150-ton puller shown in Fig. 1. With suitable split-ring adaptors to fit each size of pinion this type of puller gives satisfactory service. The pressure gage indicates the tonnage required to "pop" the pinion. This is a handy indication of the "fit" with which the pinion was applied, and serves as a check on the assembly practice used. If either too light or too heavy tonnage is indicated, the fact should be reported. Note that the safety chain should be taut, as shown, prior to removing the pinion. This takes up the reaction of the puller and prevents it from "taking off" when the pinion pops off the shaft. It also prevents the puller swinging out and striking back on the shaft with possible damage to the shaft fit or the thrust faces of the armature roller bearing.

The rule "keep tools in good condition" certainly applies to puller and adaptor parts. These highly loaded parts should be of good steel, and the register faces should be square and smooth. For best service, the ring surface which presses against the motor side of the pinion face should be as large as possible to distribute the pressure, and the ring should be as thick as can be easily assembled. All bolts should be drawn up tightly, and the threaded adaptor should be screwed up fully so all the threads share the load of 100-tons or more.

The induction heater puller, Fig. 2, is preferred by many shops. It is an electric induction coil designed to fit closely around the pinion teeth. When connected to a suitable a-c power supply, it induces large circulating currents in the metal of the pinion. These currents heat the pinion faster than the shaft, expanding the pinion and loosening its "fit" on the shaft. When just hot enough, the pinion can be "pulled" by driving steel wedges, as shown in Fig. 2. Resist the urge to hammer the wedges as if you were trying to "ring the bell" at the county fair. Use long, well-matched pairs of accurately machined wedges with ground faces. Beware of short, stubby, single wedges usually found around a shop. This will avoid the type of damage shown in Fig. 3. Here the grease flinger has been bent and the bearing cap dented by using single

(*Continued on page 58*)

This is the eighth article in the series covering heavy maintenance of locomotive electrical equipment.

Part 8 is written by W. F. Davis, Locomotive and Car Equipment Department, General Electric Co., Erie, Pa.

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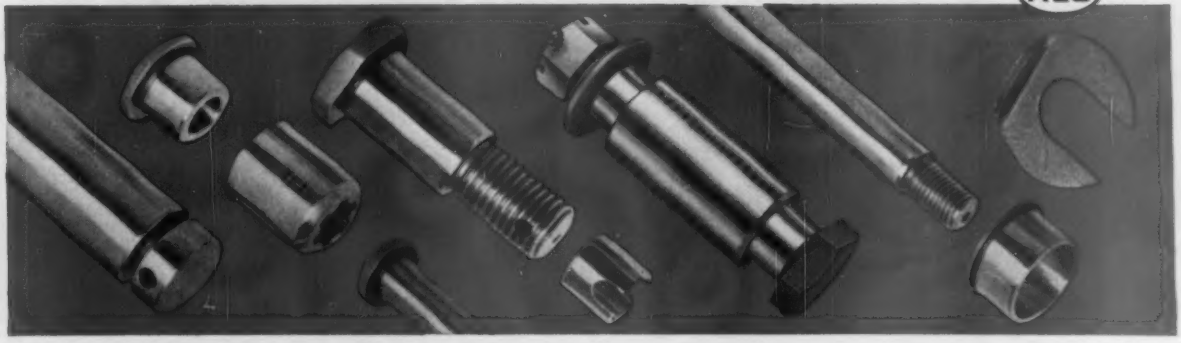

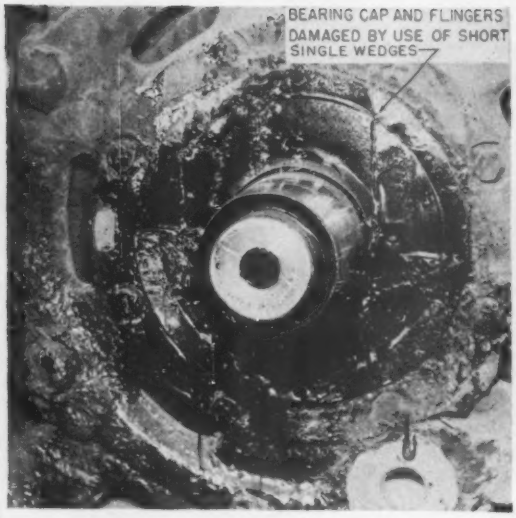

Fig. 3—Damage caused by improper wedging when pulling a pinion.

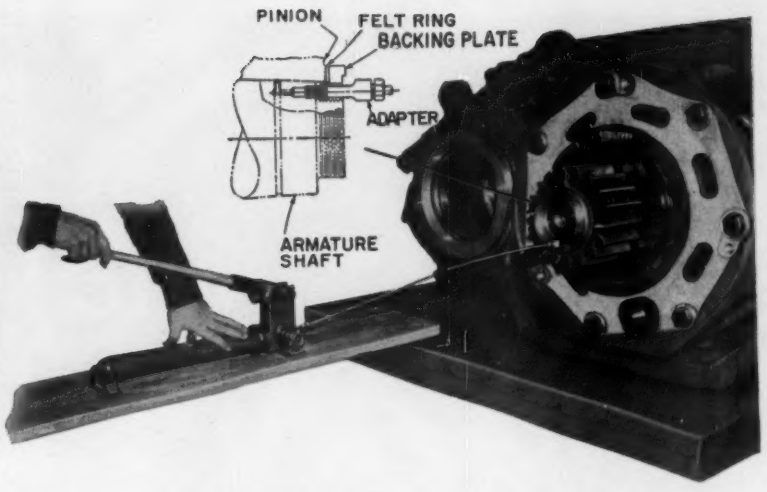

Fig. 4—Details of hydraulic float method of pinion removal.

wedges which bear on the outer tooth tip rather than close to the shaft. Also, do not use a sledge on the end of the shaft. This will damage the thrust faces of the roller bearings and mushroom the end of the shaft. Remember, pinion-pulling wedges are tools which must register against accurate machined surfaces on the pinion and shaft flinger. Even though the ends may be battered from hammering, the faces of these wedges should be kept straight and smooth. One more precaution—be careful not to exceed the prescribed heating time for each type of pinion. If the power is left on too long, there is danger of overheating the hardened steel surfaces of the pinion teeth. This will soften them and result in rapid wear if the pinion is returned to service.

There is another system of pinion removal that is quite new. It is the "float-off" system illustrated in Fig. 4. The armature shaft has a turned groove about the center of the tapered surface. A drilled hole connects this to a specially threaded fitting in the end of the shaft. A small, high-pressure pump is used to force oil through the hole and groove under the pinion fit. This expands the hub of the pinion, lubricates its inner bore and "pops" the pinion off the shaft. A safety nut with a felt ring next to the pinion is screwed on the end of the shaft. This prevents the pinion from "taking off" when it "pops" free. The equipment for this system is light and easy to use anywhere. Older motor shafts can be modified by a simple machining process.

Check the Lubrication and Bearings

Having removed the pinion, proceed to the bearings. The pinion and (PE) outer grease retaining flinger is first removed. If the flinger has threaded holes, studs can be inserted and a screw-type puller used. Examine the flinger to see if it has been bent through improper use of pinion pulling wedges. Next, carefully remove both bearing caps, (PE and CE) taking care not to disturb the grease. Observe the appearance of the grease in the caps and in and around the bearings; note its color, smell and consistency. Look particularly at the 6-o'clock position for presence of liquid oil bleeding from the reservoir of grease in the cap (Fig. 5) and entering the bearing. As long as the grease is semi-solid, holding its body without slumping down from its position in

(*Continued on page 60*)

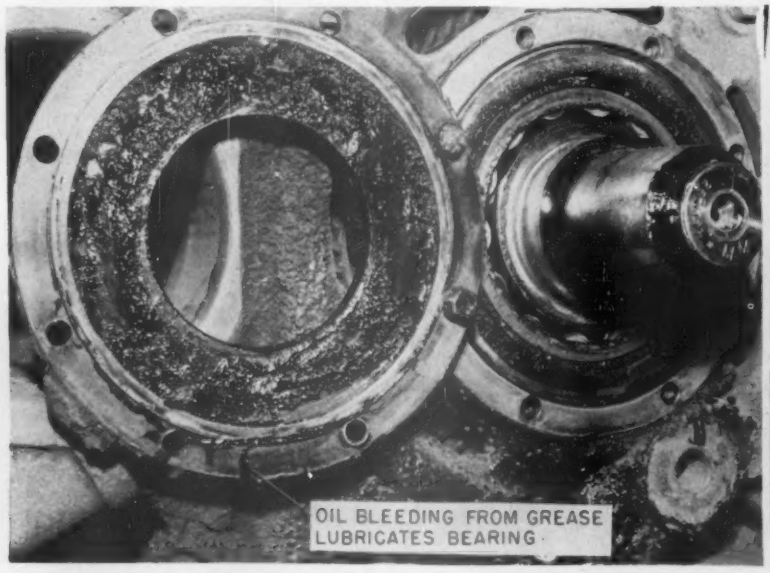

Fig. 5—Open bearing, showing grease in good condition.

Fig. 6—Use of dial indicator to measure bearing runout.

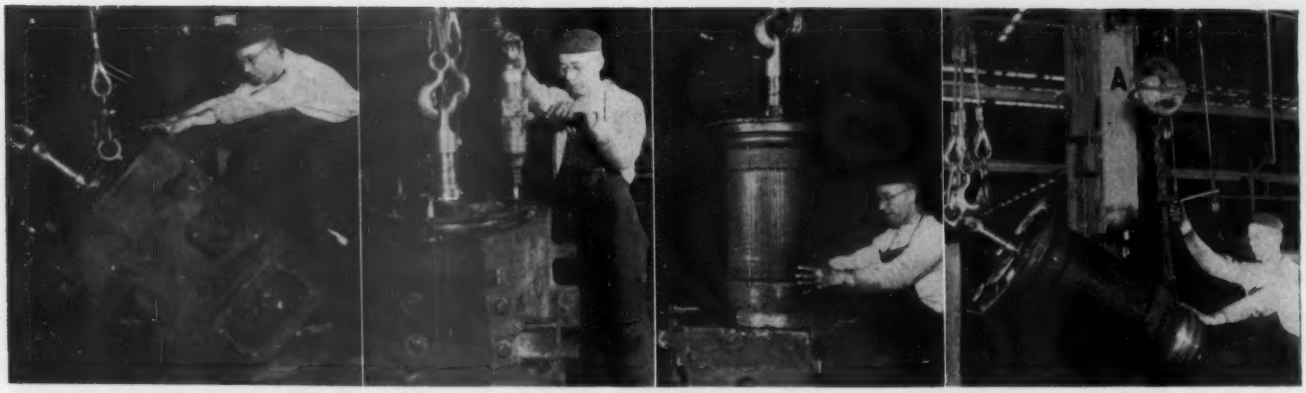

Fig. 8—Left to right—A, B, C, D—Sequence of pulling traction motor armature from frame.

Fig. 9—Use of screw-type puller to remove bearing from armature shaft.

the cap, and continuing to bleed oil to the bearing, it is in good condition. Also note the amount of grease in the cap; 60 per cent full is good. Record these observations on the check sheet.

Now is the time to check the roller bearing runouts, using a dial indicator. This is clamped to the shaft nut or bearing retaining bolt, as shown in Fig. 6, and rotates with the shaft as the armature is turned by hand. To avoid errors while taking indicator readings, keep the armature endplay all one way. It is easy to do this by blocking up the pinion end of the motor about four inches. Four indicator readings should be taken, on both ends: at 12, 3, 6, and 9 o'clock. For best results, the total indicator runout reading should not exceed 0.003 in. and should be even around the circle. Enter the readings on the check sheet. They will tell whether the frame and bearings and framehead are properly aligned. If runout is too great, parts should be checked further after disassembly.

The armature end play can easily be checked while the motor is still blocked up. With the dial indicator on either end of the shaft, the armature can be moved back and forth by prying with a small hand bar. Use a bar having about one square inch cross section and two or three feet long. It should be wedged squarely between the flat face of the steel

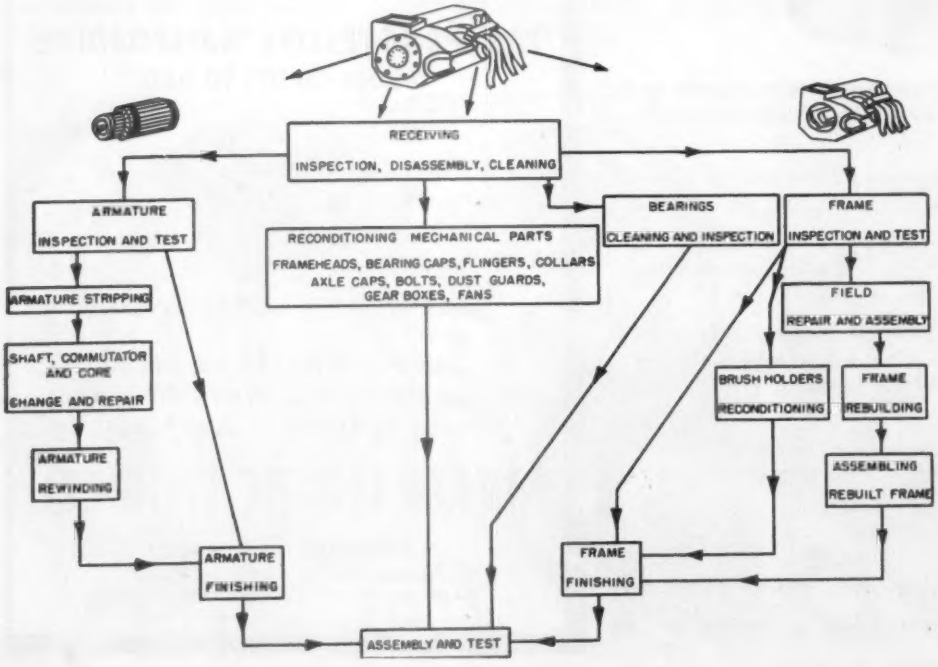

Fig. 7—Typical flow chart of backshop work on motors and generators.

(*Continued on page 62*)

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commutator cap and the frame, using a small block of wood if necessary. While watching the indicator, move the armature back and forth two or three times. This will give you the "feel" as the armature reaches the limits of its end play. After you have this "feel," record the travel of the indicator as you move the armature. Guard against pulling more heavily on the bar than necessary to "chuck" the armature its approximate 0.10-in. end play. Also, take care not to pry against the copper of the commutator or any insulated parts of the motor. The end-play is actually built into the thrust roller bearing by the manufacturer. It varies slightly with different makes of bearings but will usually be less than 0.01 in. on a new bearing. If the reading is 0.015 in. or over, recheck to be sure there is no mistake before recording it on the check sheet.

Check the Axle Caps

The correct time to accurately measure the axle cap bores is before the frameheads and armature are removed and while the caps are bolted up tight. This can easily be done using inside micrometers. Take several diameters, marking them with indelible ink so that worn areas will be clearly marked and dimensioned. Check the rabbett fits; see if you can enter a feeler gage. Then take the caps off, noting whether they are easy or hard to remove. Good tight-fitting caps will require the persuasion of a husky, copper-headed maul or some sort of a jacking device to get them off. A hoist should be used to support the cap when it is released from its frame fit. Otherwise it will bang down on the floor, perhaps damaging itself and also endangering your toes. Measure the rabbett fit dimensions on both caps and on the frame. The difference is the interference fit in thousandths of an inch. Check manufacturer's instructions for the correct fit. If the fit is loose, and you have been able to enter a feeler gage when the cap was assembled, then look further for more trouble. The bore will probably be oversize and irregular. The job is then in need of heavy repairs including welding, milling and line-boring. All of this information should be entered on the check sheet.

Let's Take it Apart

At this point you are ready to start the serious disassembly of the machine for cleaning and distribution of the parts to their respective work areas. Although the routine will vary in different shops, it will generally follow the pattern of the flow chart shown in Fig. 7.

You will probably want to remove the armature vertically, so the motor will have to be upended. The method shown in Fig. 8 will work where special equipment is not available. While the motor is horizontal, remove the bearing cartridge bolts, if used, or the bearing locking nut or plate, from the end of the shaft.

Remove all of the PE framehead bolts. Screw a couple of lifting eyes into two of the framehead bolt holes. Be sure the CE bearing cap bolts are all removed, also the flange ring which normally bears against the ends of the rollers. In other words, remember how the parts fit together and be sure that the CE bearing assembly is ready to come apart before upending the motor. Lifting with twin crane hooks, the motor is easily upended and rolled over on a couple of 2 X 4's laid flat on the floor; Fig. 8A.

With the motor in a vertical position, the weight of the armature should be taken up by the crane, Fig. 8B, while the PE framehead is being "jacked" from its tight fit with the frame. It is necessary to coordinate the lifting (inching) of the armature by the crane with the slower but even jacking of the framehead. Otherwise the crane will tend to lift the whole motor through the framehead fit, with possible dropping of the frame when the fit is released. It is important that the framehead be jacked evenly so as not to cramp it in its fit during removal. This can be done by following a progressive pattern of take-up. Take a few turns at a time on each bolt, always moving around the circle of bolts in the same direction. When the framehead is free, the armature should be carefully lifted from the frame as shown in Fig. 8C. It should then be lowered to a horizontal position with the aid of an auxiliary hoist, as shown in Fig. 8D.

For removing armature bearings and collars, a screw type puller, Fig. 9 is good. In general, all tight-fitting parts like flingers, collars, sleeves, and bearing races can be removed with a puller of this type, using suitable adaptors. The heavy plate is usually provided with a crows-foot pattern of radial slots to suit 2, 3 or 4-bolt patterns of different diameters. Heat must be used in some cases where small diameter collars are not provided with clearance behind for puller fingers to engage. An acetylene torch can be used for this, but it should be handled by an expert who knows how to play the flame around the circle and just how long to hold it on the part to be removed. The "feel" for this is acquired through experience. Quick action with a pry bar while the part is hot, is required to free it.

Removal of outer roller bearing races from frameheads and bearing housings is easily and quickly done in a suitable arbor press. A round fixture made of fairly heavy plate should be used. It should have a turned register face suitable for pressing squarely on the face of the outer race without allowing pressure to bear on the rollers or roller cage.

This railroad grade crossing which cuts across the heavily traveled Buffalo Speedway in Houston, Texas, is the site of a new experimental lighting system. Designed to reduce the inherent hazard posed by grade crossings, the system consists of two General Electric Form #4065 fluorescent luminaires, mounted diagonally at the traffic artery-railroad intersection. The approach side of the luminaire globes has been painted with yellow acrylic paint to indicate a danger area.

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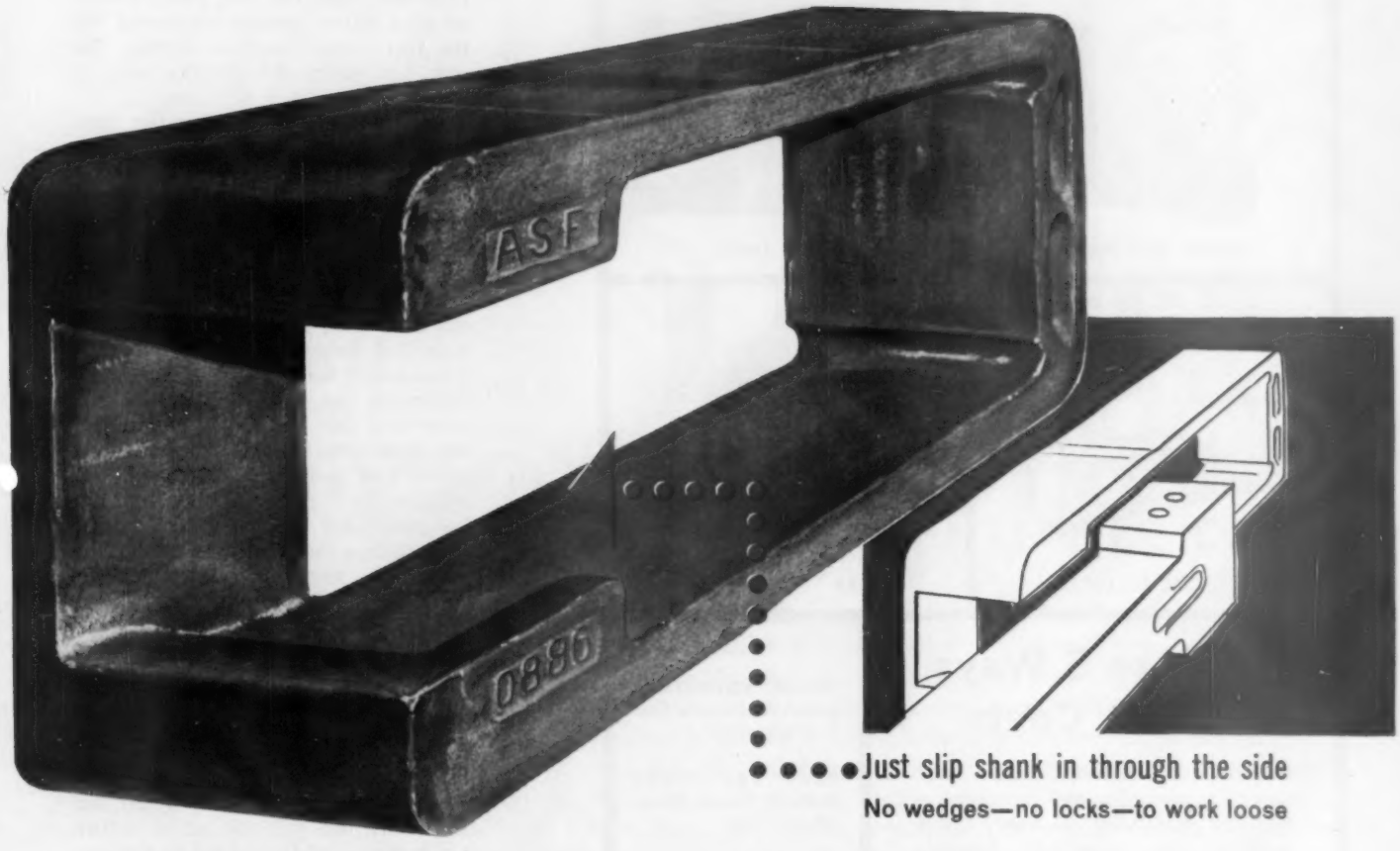

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*Patent Pending

The Engine Ran Without Fuel

(*Continued from page 54*)

engine continued to run. Then one of the maintainers proposed the fuel pipe be disconnected from the fuel pump. This was done and, with the fuel supply line severed from the fuel supply tank, the engine kept on running. The maintainers could not believe their eyes. They either had the most wonderful engine in the world or they had overlooked something.

Since the engine could only be started with the aid of the fuel pump, and since the shutter control could only be energized from the fuel pump circuit, all pipe connections were restored and the fuel pump placed in service. The unit was returned to service working satisfactorily.

Still in doubt as to what had happened, the maintainer who had first taken over the job wrote to a friend at the system diesel house where he thought they might have had a similar case. It was explained this way in the reply he received.

There had been a number of cases of this kind. They had occurred on EMD, Alco and Baldwin units. In all cases, it was found that the engine secured its continuing fuel supply (after the fuel pump was shut off), by the fuel injectors siphoning the fuel from the fuel supply tank beneath the car body. The injectors drew the fuel supply from the fuel return line, whose normal duty it was to return the excess fuel not needed by injectors, to the fuel supply tank. In this case, the fuel return line extended into the fuel tank terminating near the bottom of the tank. In other words, the fuel return line was immersed in fuel when the fuel pump was shut down.

The regular and proper plan of piping the fuel return line is to have it terminate near the top of fuel tank above the fuel level. When piped properly the fuel return line will not act as a fuel supply line in the event the fuel pump is shut down.

In a case of this kind, it is first necessary to have the fuel pump running to cause the fuel return line to be full to give the injectors an opportunity to siphon the fuel supply from that source, the instant the fuel pump is shut down.

A variation of this case occurred on an FP unit equipped with a steam generator. An interconnection of piping of the fuel supply for the steam generator and the fuel supply to the engine permitted the fuel injectors to siphon fuel supply for the engine from the fuel line to the steam generator. A rearrangement of the piping solved that case.

(Continued from page 8)

entire AWG range of 8 to 4/0. Multi-faced crimping dies are permanently mounted within the head of the tool. The operator selects the proper dies, to match the size terminal being installed, by loosening locator pins and rotating the dies to the desired correct position. The variety of wire sizes accommodated eliminates the need for several crimping tools. *American Pamcor, Inc., Dept. RLC, 181 Hillcrest ave., Havertown, Pa.*

Single-Stage Regulators

These single-stage inverse-type regulators, for oxygen, acetylene, hydrogen, nitrogen, argon, helium or carbon dioxide, provide a substantially higher delivery rate and maintain a more constant delivery pressure. There is no drop-off in working pressure as cylinder pressure decreases, and the gas is more completely exhausted from the cylinder.

Without tools, the spring case and low-pressure cavity can be opened and the diaphragm removed. The sure-grip brass adjusting knob is a change from the usual T-bar type, and a hexagonal nut projects from the knob end to permit the use of a six-way wrench. *Air Reduction Sales Company, a division of Air Reduction Company, Dept. RLC, 150 East 42nd st., New York 17.*

Wrought Iron

The improved 4-D wrought iron is produced by substantially increasing the deoxidization of the base metal; increasing the phosphorus content in relation to the other material components and using a more siliceous silicate fiberous material. Approximately 250,000 of these silicate fibers are evenly distributed throughout each cross-sectional square inch of the metal.

Tests have shown that 4-D wrought iron has greater uniformity, improved physical and mechanical properties, and superior resistance against many kinds of corrosive forces, including those caused by severe industrial atmospheres, acid solutions, salt water, and steam condensates. *A. M. Byers Company, Dept. RLC, Clark building, Pittsburgh 22.*

(Continued from page 65)

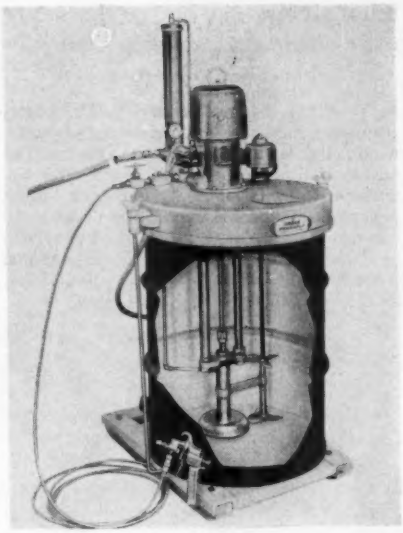
Ultrasonic Cleaning Unit

This Model R-50 self-contained ultrasonic cleaning set-up in a single cabinet includes a heater, temperature control, filtration and recirculation system in addition to the ultrasonic generating equipment. It is small enough to be moved easily. Overall dimensions are 22 x 19 x 37 in. high. Piping, pump and filter are of stainless steel, with Teflon gaskets, making the unit suitable for alkaline solutions, solvents, and mild acids.

The tank, itself, is 6 x 16 x 11 in. deep, with a total working volume of 5 gal. The transducers mounted to the bottom have a rate input of 250 r-f watt average (1 kw peak), which convert into mechanical vibration at 38 kc. This high-speed agitation causes caviation in the liquid, providing a gentle but thorough scrubbing action. Even insoluble soils may be removed in minutes—sometimes seconds—and little operator attention is necessary. *Branson Ultrasonic Corporation, Dept. RLC, 40 Brown House Road, Stamford, Conn.*

Waterless Cleaner

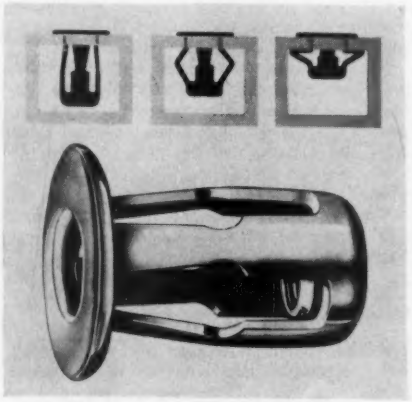
Stratogel eliminates the need to stock different liquid or powder compound cleaners and the use of water. It is a concentrated paste-cream which is applied quickly and easily with a damp cloth or sponge. It removes oil, grease, scum and other soils from unpainted and painted metal surfaces, and from glass, plastic, and fiber glass. Dirty engines, toilet fixtures, instruments, venetian blinds and cushions all respond to this waterless cleaner which comes in 1-lb jars, 4-lb pails, and 40-lb drums. *Fine Organics, Inc., Dept. RLC, 211 East 19th st., New York 3.*



Paint Spray

The Hydra-Spray eliminates the need for atomizing air, heat, or excess solvents in spray painting. A combination of high fluid pressure and a small fluid nozzle create fine material break-up without atomizing air. This is said to reduce overspray, bounce-back, and hazardous fumes to a minimum.

The process uses a specially engineered, air-powered pump that produces fluid pressure twenty times that of the inbound air pressure. Being air powered, the pump exerts no pressure in the container, eliminates electrical connections, and operates only while actually spraying. *Gray Company, Dept. RLC, 1020 Sibley st., N.E., Minneapolis 13.*



Blind Fasteners

The Jack nut is a blind fastener with threads which grip any material from 0 to 3/8 in. thick. It is self-adjusting to grip evenly on rough and curved, as well as smooth and level, surfaces. Jack nuts can be used as rivets or blind fasteners in expansion spaces as small as 3/8 in. They provide firm nutplates for attachment screws, and the anchorage is permanent, permitting screws to be removed and replaced.

Jack nuts allow holes to be fashioned be-

(Continued on page 68)

INSIDE STORY of the new attack on the HOT BOX PROBLEM

AAR APPROVED
for limited application
in interchange service

CLEVITE Sealed Sleeve Bearing Cartridge

...new, permanent, soundly engineered and economical journal bearing conversion for freight cars

Field Reports:

In continuing road and laboratory tests, under extremes of actual and simulated operating conditions, Clevite Cartridges are exceeding all performance expectations.

Careful shop checks show that Clevite Cartridges require less modification, are installed at lower cost than any other permanent conversion.

Keep your eye on CLEVITE!

DISTRIBUTED BY:

STANDARD CAR TRUCK COMPANY

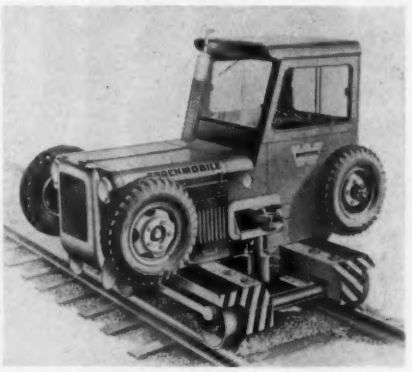
332 S. Michigan Ave., Chicago 4, Illinois. *In Canada:* Consolidated Equipment Co., Ltd., Montreal 2, Quebec

The CLEVITE Bearing Cartridge is a development of Cleveland Graphite Bronze Co. division of Clevite Corporation, Cleveland 10, Ohio

What's New

(Continued from page 66)

fore, during, or after fabrication. They do not require special holes and hole size is not critical. They are available in two lengths: short for thicknesses from 0 to 3/16 in. and long for 0 to 3/8 in. They are installed with a screwdriver and any U.S. standard 6-32, 10-24, or 1/4-in.-20 screw. *Molly Corporation, Dept. RLC, Reading, Pa.*



Torque Converter Trackmobile

The improved torque converter Trackmobile is equipped with an all-new power train which includes a new engine and a torque converter-hydraulic transmission combination.

The six-cylinder engine enables the unit to develop 13,000 lb of drawbar pull. The torque converter and hydraulic transmission eliminate clutch manipulation and conventional gear shifting; enable operators to have more exact control of the Trackmobile's movement at all times; multiply engine torque to fit load requirements, and provide an oil cushion to protect the Trackmobile from the effects of shock loading. *Whiting Corporation, Dept. RLC, Harvey, Ill.*

Cable Fault Locater

The ARI Thumper cable fault locater is a device to convert the high voltage, low current output of a d-c high potential tester into a high voltage, high current impulse supply for locating faults in electrical power cables.

It consists of a high-capacitance, high-voltage capacitor, an adjustable sphere gap, necessary current limiting resistors and terminations for connecting the unit between the Hypot and the cable under test. Breakdown voltage may be varied to suit the fault in the cable. By proper adjustment of the gap spacing and the voltage setting of the Hypot, the test potential and repetition rate of the pulse voltage may be varied to suit conditions.

In operation the capacitor charges until the voltage is sufficient to flash across the sphere

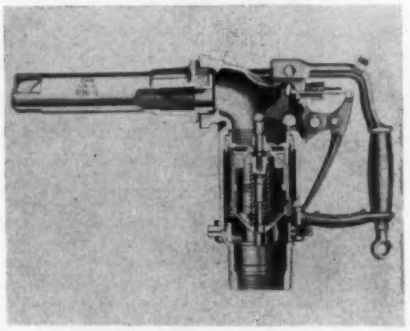
(Continued on page 70)

What's New

(Continued from page 68)

gap. The other side of the gap is connected to the conductor of the cable. The steep wave front pulse travels along the cable until it reaches a fault. With a high enough potential, the steep wave pulse (commonly called the tracer signal) discharges across the fault to ground and returns to the tester. The exact location of the fault may then be determined in many cases by moving along the cable and listening for the point at which the tracer signal breaks across the fault. In case of a dead short or where other conditions limit noise, a pickup coil with suitable indicating devices or ear phones may be used.

The Thumper cable fault locater is rated 25 kv, d-c at approximately 315 watt-seconds. It is completely enclosed in a metal box with a transparent lucite cover. The sphere gap is adjustable from outside the box, and its adjustment is calibrated to give an approximation of the voltage setting and may be adjusted while the unit is in operation. This instrument is approximately 15 in. x 15 in. x 15 in. and weighs about 90 lb. *Associated Research, Inc., Dept. RLC, 3777, W. Belmont Ave., Chicago 18.*



Fueling Nozzle

The OPW-Jordan 620 fueling nozzle features high flow capacity and shockless closure. It will deliver 220 gal. per minute at 50 psi. The adjustable slow-closing mechanism prevents line shock, even on pressures up to 100 psi. It is available in 2-in., 2½-in. and 3-in. sizes. The high-tensile aluminum alloy body has bronze trim, with composition seats for tight shut-off. *Sales Division of OPW Corporation, Dept. RLC, 6013 Wiehe Road, Cincinnati 13.*

Epoxy Resins for Motor Re-insulation

A low-cost method for reinsulating traction armatures which has been tried out for a period of two years on western railroads is now available for general application.

Insulation shrinkage during aging of insulation permits chafing and allows for dam-

(Continued on page 72)

Valves come clean!

FASTER!
Valves can be cleaned in 15 seconds.

SAFER!
Chuck holds valve; fingers are never near wire brush.

BETTER!
Hardest carbon deposits disappear, leaving a clean, shiny surface.

EASIER!
Takes the drudgery out of valve cleaning. The machine does the work. No skill required.

CHEAPER!
The quick change adaptor allows the brush to be quickly and easily reversed thus bringing sharp cutting points into play. Dull brushes stop cutting. Frequent reversing triples the life of the brush.

WITH THE NEW SIOUX

REVERSING KEEPS SHARP EDGES AT WORK

QUICK CHANGE ADAPTOR

VALVE CLEANER ATTACHMENT

The SIOUX Valve Cleaner can be supplied with bench grinder as shown or sold as an attachment to fit an existing 6″, 7″, or 8″ bench grinder. It's another entirely new product exclusively from SIOUX to you.

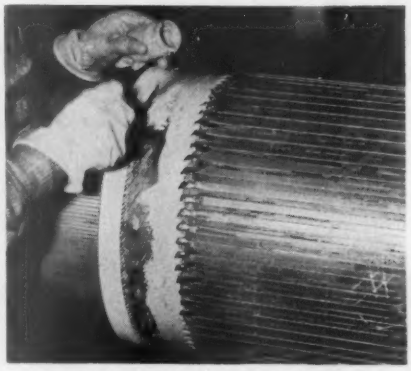
ALBERTSON & CO., INC.
SIOUX CITY, IOWA, U. S. A.

LOOK UNDER "TOOLS—ELECTRIC"

NEW AIR IMPACT WRENCHES • NEW AIR SCREWDRIVERS • NEW "PELICAN" NUT ACCUMULATORS • ELECTRIC IMPACT WRENCHES • DRILLS • GRINDERS • SANDERS • POLISHERS • SCREWDRIVERS • PORTABLE SAWS • VALVE FACE GRINDING MACHINES • FLEXIBLE SHAFTS • ABRASIVE DISCS

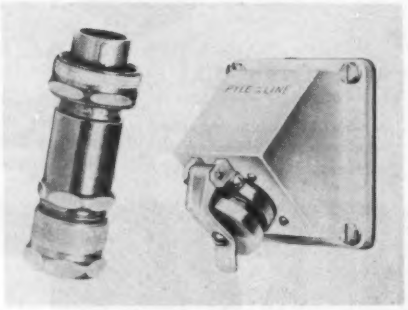
What's New

(Continued from page 70)



age caused by vibration. The new method of reclamation is said to eliminate rewinds by satisfactorily reinsulating traction coils in place on the armature.

The insulation material, which is applied by spatula, cures hard in a half-hour at room temperature. It is claimed to provide a dielectric strength of 500 volts per mil and to bond tightly to old insulation and adjacent metal. *Epoxylite Corporation, Dept. RLC, 10829 E. Central ave., El Monte, Calif.*

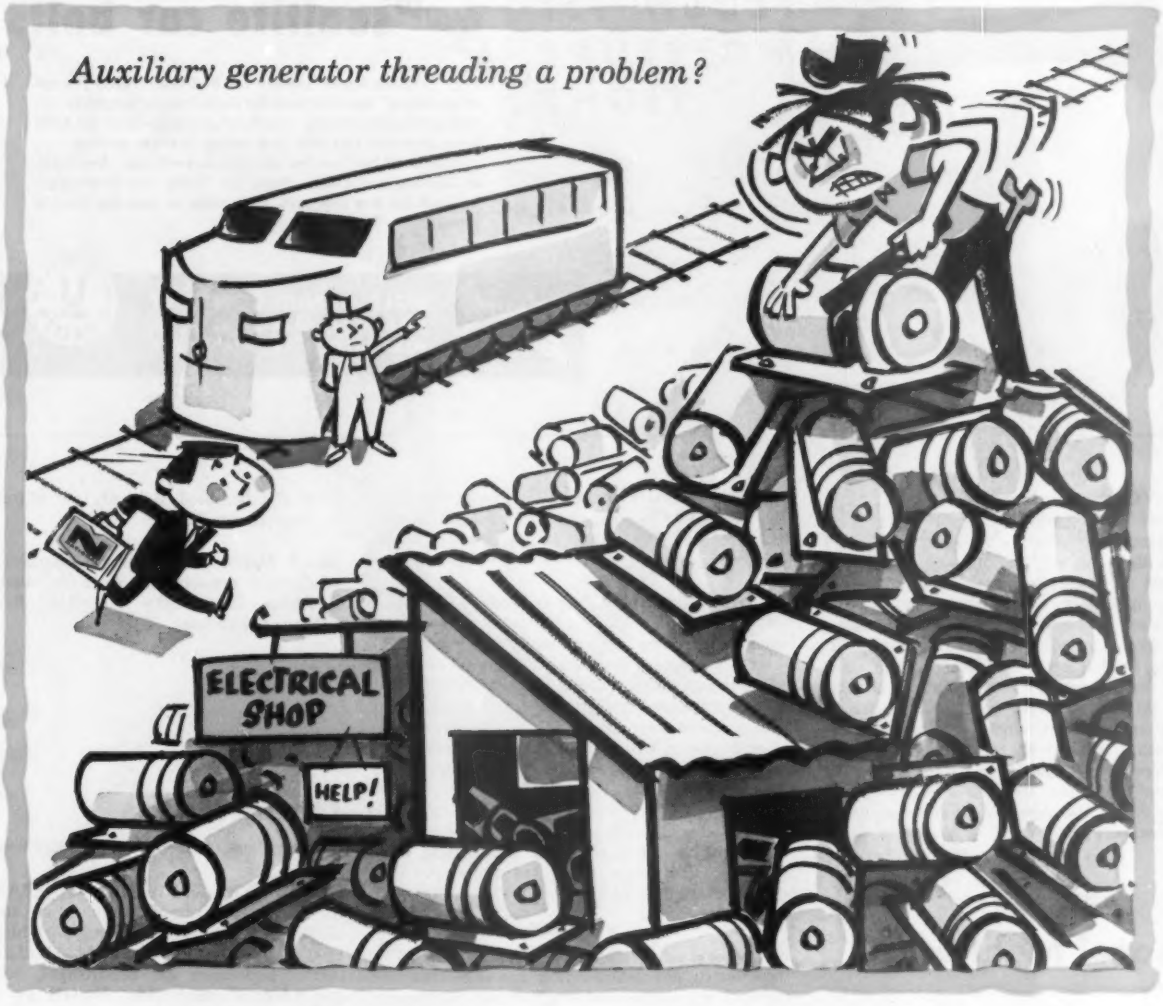


Plug and Receptacle

These plugs and receptacles, designed for severe industrial use, are identified as Pyle-Star-Line Circuit Breaking Series "C" Connectors. They are available in cable connector, panelboard, bulkhead and conduit fitting types and are for interrupting circuits in N.E.C. ampere ratings of 30, 60, 100, and 200 amp, 600 volts, a-c. All types have a double lead plug coupling thread for quick connect and disconnect action. Threaded housings can be furnished with dust cap or a hinged spring flap cover.

Interchangeability of components permits many assembly combinations, including a wide choice of contact configuration inserts ranging from 4 to 100 poles for power, control, and electronic circuits.

Circuit braking types are furnished with solder well or pressure type (solderless) wire terminals. Taper well or crimp type contacts are available with other contact inserts. *Pyle-National Company, Dept. RLC, 134 N. Kostner ave., Chicago 51.*



Your NATIONAL brush man stopped costly auxiliary generator repairs!

JOHN GIBB

Extreme threading on auxiliary generators caused excessive commutator maintenance on this mid-western railroad. The brushes the road had been using could not handle widely fluctuating loads, says "National" Carbon Brush Man, John Gibb.

John recommended that a "National" brush be tested. Once the first results were in, John's fellow "National" Carbon Brush Men followed through with similar tests on roads all over the country. Tests showed greatly improved performance and lower maintenance costs.

This is typical of the service National Carbon makes available to the nation's railroads. There are twenty-seven "National" Carbon Brush Men in the field ready to assist with any brush problems you might encounter.

Call on your "National" Brush Man today. Or write: National Carbon Company, Division of Union Carbide Corporation, 30 East 42nd Street, New York 17, N. Y.

(*Continued from page 18*)

and Fuel Oil, dated September 1957, revised December 1957. It is the AAR's thought that use of this manual would reduce cost of testing lubricating oil and fuels, improve quality of such work, and permit comparison of work of all testing agencies to provide a coordinated system of applied research. By having a uniform code of conducting tests and reporting results, tests conducted on one railroad may be interpreted by other railroad's personnel eliminating need of duplicate testing. *F. H. Stremmel, secretary, Mechanical Division, Association of American Railroads, 59 East Van Buren st., Chicago 5. To members, $2.00 each; to other than members, $4.00 each.*

Personal Mention

Atchison, Topeka & Santa Fe.—*San Bernardino, Calif.:* R. J. GREGORY transferred from Albuquerque to Los Angeles Division shops as general car foreman.

Baltimore & Ohio.—*Baltimore:* H. F. DEERY appointed road foreman of engines, Baltimore Division.

Chesapeake & Ohio.—*Richmond, Va.:* E. R. HAUER, general mechanical engineer, retired. T. P. HACKNEY, JR., appointed mechanical engineer. E. F. STARK, JR., appointed shop engineer.

Chicago, Milwaukee, St. Paul & Pacific.—*Savanna, Ill.:* Duties of W. W. HENDERSON, master mechanic, extended to include supervision over locomotive department matters on the Madison Division, except Madison, Wis. This is a correction of announcement in March issue. *Milwaukee:* Duties of W. N. BITTNER, shop engineer, extended to include supervision over Milwaukee wheel and forge shops and Tomah, Wis., shop.

Missouri Pacific.—*St. Louis:* J. H. THOMAS appointed assistant to chief mechanical officer. G. V. GLENN appointed supervisor of diesel equipment, succeeding W. P. SULLIVAN, retired.

Pennsylvania.—*Morrisville, Pa.:* LOUIS V. TOWNSEND, enginehouse foreman at Northumberland, Pa., appointed enginehouse foreman, succeeding HUGH M. WYROUGH, retired.

St. Louis-San Francisco.—*Tulsa, Okla.:* E. W. BROWN appointed road foreman of equipment. *Fort Smith, Ark.:* N. C. SWEETIN appointed road foreman of equipment.

Obituary

John Jackson, former engineer of tests, Missouri Pacific, died suddenly on March 6 at St. Petersburg, Fla.

John P. Morris, retired general manager of the mechanical department, Santa Fe, died in the Redlands Community Hospital, Redlands, Calif., on February 20.

Supply Trade Notes

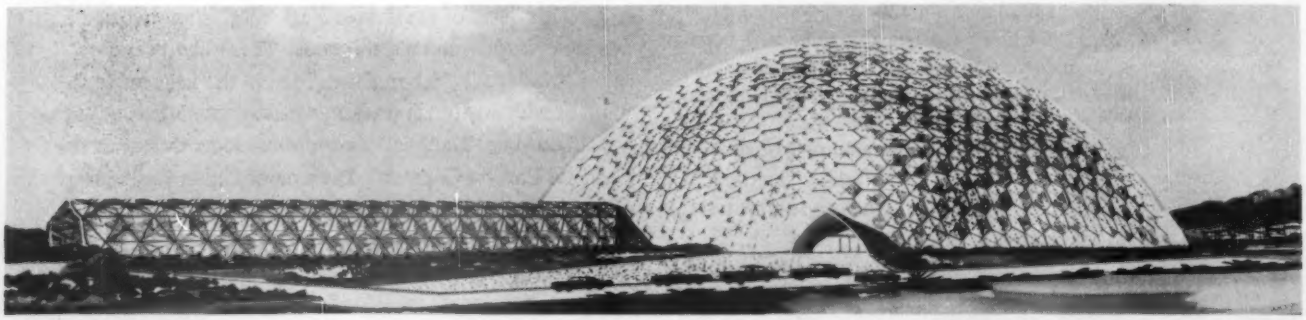
NEW YORK AIR BRAKE COMPANY.—*R. C. Howell,* service engineer in southern territory, has been transferred to Chicago as special representative. *J. M. McLaughlin,* former supervisor car department, Seaboard Air Line, succeeds Mr. Howell as service engineer in Atlanta, Ga.

■

AMERICAN CREOSOTING CORPORATION.—*Harry W. Foster* has been appointed to the sales staff of American Creosoting, for the midwestern area.

■

WINE RAILWAY APPLIANCE COMPANY.—*George B. Christian,* vice president-sales, retired on March 1.



Artist's conception of the all-steel "Union Dome," said to be the world's largest circular building without internal supports, which is being built in Baton Rouge, La., by the Union Tank Car Company of Chicago. The 10-story high geodesic structure (right) is 375 ft across its interior base and 116 ft high at its center. A special paint area (left) is 200 ft long and 20 ft high. The cost of the dome and the tank car repair facilities it will house is in excess of $1,000,000, considerably less than the conventional car repair shop of this size. The project is scheduled for completion in mid 1958.

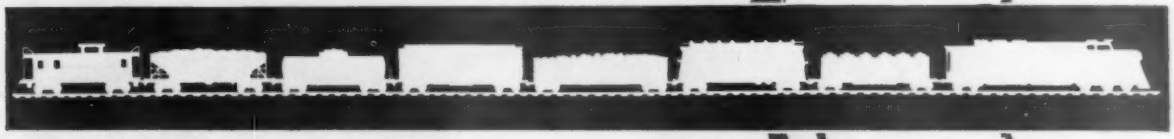
NEW "RED CAP" BRUSHES BY SPEER

On your most rugged haul, try Speer's new "Red Cap" brushes. They are made to stand up under the toughest conditions of vibration, sudden shocks, rough roadbeds and long-haul running. Special double-duty shock absorbers take the beating...brushes themselves aren't touched. Results are longer brush life (breakage and shunt-fraying virtually eliminated), maintenance-free service, improved commutation and real long-haul reliability.

"Red Cap" brushes are yet another example of Speer's leadership in brush design. There's a Speer brush exactly right for every railroad application. Write today for details.

How "Red Caps" Work

Specially designed hard rubber cap, laminated to softer neoprene pad, is mounted at top of brush. Initial impact of vibration and shocks is broken by hard cap. Design insures even distribution of remaining pressures over entire surface of soft underpad, allowing full absorption of vibration and shocks with minimum of compression. Hard cap also resists wear and indention by spring finger, permitting free movement and most efficient operation of brush throughout its life.



SPEER Carbon Co.
St. Marys, Pennsylvania

Supply Trade Notes

(*Continued from page 74*)

ELECTRIC STORAGE BATTERY COMPANY. — The Exide Industrial Division of Electric Storage Battery has become the exclusive marketing organization for battery-charging equipment manufactured by the *Electric Products Company*, Cleveland.

■

INDUSTRIAL BROWNHOIST CORPORATION. — *Frank McBride* has been appointed district sales manager at Cleveland. *William D. South, Jr.*, succeeds Mr. McBride as a sales representative in the Philadelphia office.

■

CHAMPON RIVET COMPANY. — *Joe De Santo* has been appointed manager of welding sales, Chicago section.

■

CRANE COMPANY. — *William O. Brown*, manager west coast sales district, has been appointed general manager of sales at Chicago.

■

MacLEAN-FOGG LOCK NUT COMPANY. — *James G. Eliasek* has been appointed representative in southeast states with headquarters in Richmond, Va.

■

INTERNATIONAL EQUIPMENT COMPANY, LTD. — International Equipment of Montreal has concluded arrangements for the manufacture and sale in Canada of all railway products of the *Keystone Railway Equipment Company* of Chicago.

F. S. Downs

J. Jarvie

R. Aldag

R. J. Hondlik

AIR REDUCTION SALES COMPANY. — *Fred S. Downs*, railroad sales representative, has been appointed zone manager, Railroad Sales, Eastern Region, succeeding *C. B. Armstrong*, retired.

■

EX-CELL-O CORPORATION. — *James Jarvie*, a sales representative, has been appointed general sales manager of Ex-Cell-O's Industrial sales organization in Toronto, Canada.

■

FAIRBANKS, MORSE & CO. — *Robert Aldag*, manager of the sales engineering department, has been appointed manager of the Railroad Division.

■

GENERAL MOTORS CORPORATION, ELECTRO-MOTIVE DIVISION. — *Richard L. Terrell* has been appointed administrative assistant to the general manager, succeeding *George W. Elsey*, retired. *Raymond H. Bish*, manager of manufacturing services and facilities, has been appointed works manager, succeeding Mr. Terrell. *George D. Baker*, manufacturing manager of the La Grange, Ill., plant, has been appointed assistant works manager. *R. J. Hondlik*, assistant manager of parts sales, has been appointed parts sales manager, succeeding *M. Anderson*, retired.

■

PULLMAN-STANDARD CAR MANUFACTURING COMPANY. — *Oscar E. Rothfuchs* has been appointed assistant manager of works, and *M. B. Burns*, general superintendent at Michigan City, Ind., succeeding Mr. Rothfuchs. Mr. Burns was previously assistant general superintendent.

■

ELECTRIC STORAGE BATTERY COMPANY. — *John R. Smyth*, chief control engineer, has been named to the newly created post of assistant director of engineering. Exide Industrial Division. *Lowell K. Lembke* has been appointed railway markets supervisor. He was formerly a sales and service engineer in Kansas City, Mo.

HELPS FROM MANUFACTURERS

The following compilation of literature—including pamphlets and data sheets—is offered free to railroad men by manufacturers to the railroad industry. To receive the desired information write direct to the manufacturer.

DRILL GRINDER. 4-page Bulletin 4400 describes the Sellers principle of drill grinding as well as the design and construction features of the Sellers 10-G drill grinder for grinding 1¾-in. to 5-in. diameter drills. (Write: *Consolidated Machine Tool Division, Farrell-Birmingham Company,* Dept. RLC, 565 Blossom Road, Rochester 10, N. Y.)

LUBRICATION EQUIPMENT. Catalog 92 features lubrication fittings, grease guns, centralized power lubrication systems and accessories, with dimenson drawings. (Write: *Lincoln Engineering Company,* Dept. RLC, 5702-14 Natural Bridge ave., St. Louis 20.)

CATALYTIC PROTECTIVE COATINGS. 8-page booklet describes the adaptability of IFCO catalytic protective coatings for a wide range of industrial usage. (Write: *Industrial Finishes Co.,* 1119 Land Title Building, Broad and Chestnut sts., Philadelphia 10.)

PRECISION ENGINEERED BELLEVILLE SPRINGS. 12 pages, color, illustrations, diagrams and design data. Contains information on use of coned disc springs, including formulae for linear load-deflection curve springs. (Write: *Union Spring & Manufacturing Co.,* Dept. RC, New Kensington, Pa.)

HOMOGENEOUS PACKINGS.—4-page Bulletin AD-163 describes uses, pressure, construction, available sizes, and procedures for installation of Garlock line of homogeneous U-cup packings. (Write; *Garlock Packing Company,* Dept. RLC, 420 Main st., Palmyra, N. Y.

BRUSHES.—12-page bulletin, "Brushes for Electrical Rotating Machinery," describes complete line of carbon and graphite brushes and gives detailed information on selecting the right brush for a special job. Separate sections devoted to brushes for alternating and direct-current equipment. (Write: *Speer Carbon Division, Speer Carbon Company,* Dept. RLC, St. Marys, Pa.)

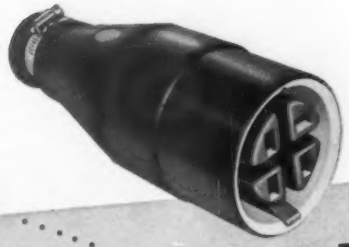
SLINGS.—58-page booklet contains sections on Braided Safety slings, Brolock slings, standard slings, sling fittings, load capacity tables, instructions on their use, and a section on how to order. (Write: *Broderick & Bascom Rope Co.,* Dept. RLC, 4203 Union blvd., St. Louis 15.)

OXWELD CUTTING MACHINES.—28-page catalog (Form 4487) covers complete line of Oxweld flame-cutting machines ranging in size from small portable units to large multi-blowpipe cutting machines. Includes also complete specification for each machine, illustrations of typical installations, and a description of machine accessories such as automatic and magnetic tracing units. (Write: *Linde Company, Division of Union Carbide Corporation,* 30 East 42nd st., New York 17.)

ADVERTISERS IN THIS ISSUE

"This index is an editorial feature maintained for the convenience of readers. It is not a part of the advertiser's contract and Railway Locomotives & Cars assumes no responsibility for its correctness."

LOOK FOR THIS
. . . MARK OF QUALITY!



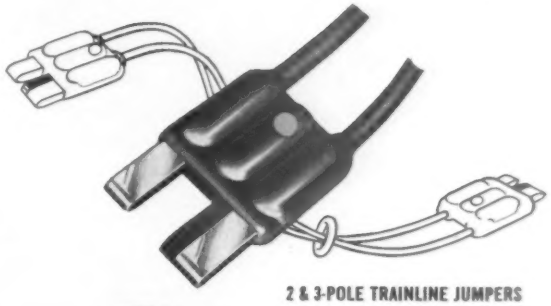
A. C. STANDBY PLUGS
Attachable or Molded-to-Cable designs with replaceable contacts. Attachable plug illus.

JOY CONNECTORS for CAR EQUIPMENT!

BATTERY CHARGING PLUGS
Attachable or Molded-to-Cable designs with replaceable contacts. Attachable plug illus.

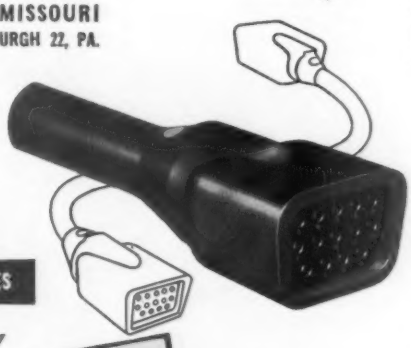
If ease of installation, safety and dependable performance are important considerations in your selection of electrical connectors . . . JOY plugs and receptacles rate "top billing" on your "preference list." Factory molded as trim, rubber insulated/Neoprene jacketed units that are absolutely safe to handle even in dripping wet installations . . . they're shatterproof, distortion-resistant and practically immune to damage by oils, grease and car washing solutions.

Complete details on JOY connectors for Car equipment as well as many other railway needs may be found in Bulletin #B64. If you haven't received your copy, or need extra copies . . . please fill out and mail the coupon below to:



2 & 3-POLE TRAINLINE JUMPERS
Neoprene/rubber insulated. 2-pole unit illus.

JOY MANUFACTURING COMPANY
ELECTRICAL PRODUCTS DIVISION
1201 MACKLIND AVENUE, ST. LOUIS 10, MISSOURI
EXECUTIVE OFFICES — HENRY W. OLIVER BLDG., PITTSBURGH 22, PA.



14-POLE R. R. JUMPERS
For car communication and entertainment circuits.

MATING RECEPTACLES
available for above plugs!

Get the facts on these Products in B64

Send me_____copies of JOY'S
Railroad Catalog # **B64**

☐ Have your Representative call.

NAME _____

TITLE _____

RAILROAD _____

_____

CITY _____ ZONE _____ STATE _____

CD 358.1

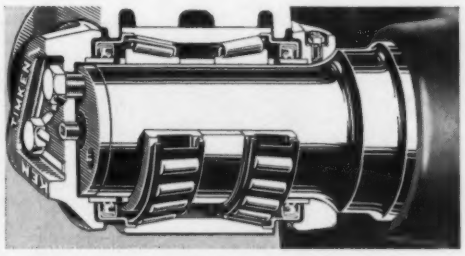
WORLD-WIDE SERVICE
WORLD-WIDE DISTRIBUTION

40 Railroads now have over 13,000 "Roller Freight" cars in interchange... *that's over 1/2 of all "Roller Freight"*

TODAY, 40 railroads and other freight car owners are sharing more than 13,000 Timken® bearing equipped freight cars with other railroads. They're leading the way to a new era in railroading when all freight is "Roller Freight"—when the railroads will realize an estimated annual saving of $113 per car or a total of $224,000,000 in maintenance and operating costs.

"Roller Freight" in interchange makes for better railroading because the railroads can't be better than their interchange system. By putting "Roller Freight" in interchange, the railroads are investing in their future together.

These forward-looking railroads know that "Roller Freight", freight cars on Timken tapered roller bearings, are the cure for the hot box problem—No. 1 cause of freight train delays. They eliminate the cause of the hot box—the friction bearing itself. They *roll* the load; never *slide* it.



"Roller Freight" not only cures the hot box problem, it speeds shipments through terminals too because you can inspect Timken bearings ten times faster than friction bearings. Shipments move faster on the road *and* through terminals. It's helping railroads in the battle for business.

Get the full story on "Roller Freight" and find out why more and more railroads are making the switch. Write for your copy of "How America's Railroads Can Save $224,000,000 Annually". Write: The Timken Roller Bearing Company, Canton 6, Ohio. Canadian plant: St. Thomas, Ontario. Cable address: "TIMROSCO".

TIMKEN TAPERED ROLLER BEARINGS ROLL THE LOAD

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